

HAND

AND

MACHINE

# WOODWORK



H. G. MILLER

Property

Name	Class	Year
Jerry Anderson	259	65
Stu Maclellan	2124	73
Brian Schrey	1529	71
Adolf Fox Roi	3003	#15
Jeff Board	3524	
Ken Cheung	2020	15/11/71

~~Property~~  
~~1971~~  
~~1972~~  
~~1973~~

*Hand*

**HAND AND MACHINE**

**WOODWORK**

*Hand*

**H. G. MILLER**

*Technical Director*

*Glendale High School*

*Tillsonburg, Ontario*

*Director*

*Keith King*

*Illustrated by*

**G. FANTUZ**  
**KEITH KING**

*14*

**TORONTO**

**THE MACMILLAN COMPANY OF CANADA LIMITED**

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dustry. Most industries conduct safety campaigns in an effort to prevent accidents, which are costly to both the employees and the company.

You will be asked to adhere to safety rules all your life — whether you are driving, working in a shop or factory or on construction, or engaged in any other form of industrial activity.



FIG. 1 A Student Properly Dressed for Work.

As an introduction to safety rules you will be asked to observe later on in life, and for your own safety in the school shop, we have made the foregoing list of general rules to which you must adhere. You should learn to accept these safety precautions not as arbitrary rules but as part of a constructive programme for your benefit and safety. You will be a better person if you adopt this attitude toward safety.

#### ASSIGNMENT, SAFETY RULES

1. Why should safety first be stressed in woodworking?
2. How does good shop conduct prevent accidents?
3. How should you be dressed for shop work?
4. Why is neatness a factor in shop safety?
5. Why should even the slightest injury be treated with first aid?
6. List any other safety precautions that you consider should be observed in a wood shop.
7. Why does industry place so much stress on safety?
8. What should be your attitude toward safety in the school woodworking shop?

## CHAPTER

# 9

## PLANES AND PLANING

The tool most necessary to reduce a piece of stock to size and make it smooth and square is the plane.

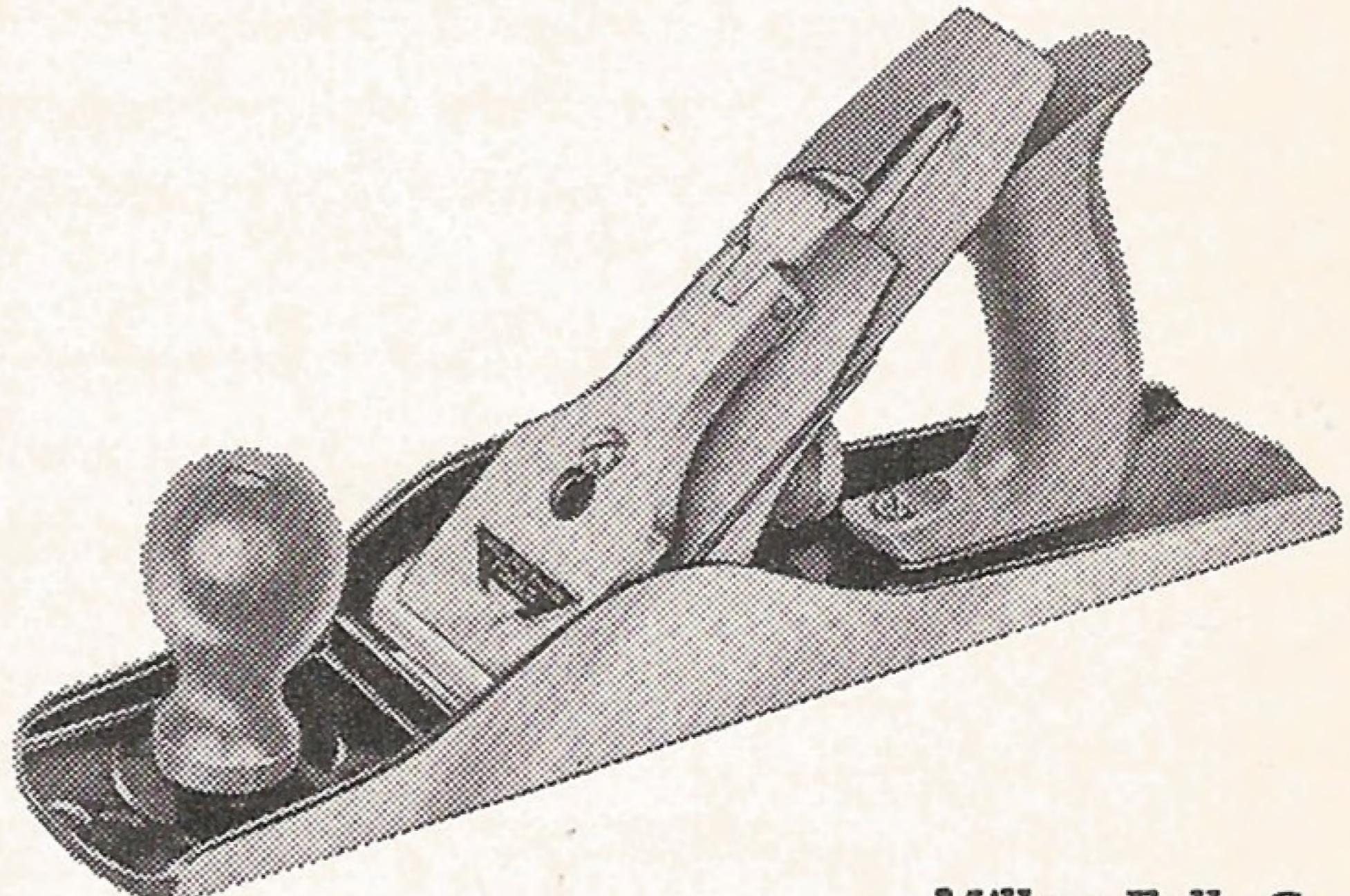
The first planes used were merely chisels placed in a wooden block. The blade was held in place at the correct depth by a wedge. Since those days many advances have been made in the manufacture of planes, and they are now made in many shapes and sizes, each for a specific purpose. However, the principle of the cutting action is the same in all types.

**Bench Planes.** The planes that are the most often used in general wood-work are known as bench planes. They include the smoothing, jack, fore and jointer planes, which are illustrated in Figures 57 and 58.

The smoothing plane is used for planing short stock smooth and flat.

Its particular purpose, as its name implies, is to make a very smooth surface. It is often used to finish plane a board after it has been rough planed with a larger plane. The smoothing plane is generally 9" long and 2" wide, and the same construction and design as the jack plane shown in Fig. 57.

The jack plane is the general-purpose plane that is used more than any



*Millers Falls Co.*

FIG. 57 Jack Plane.

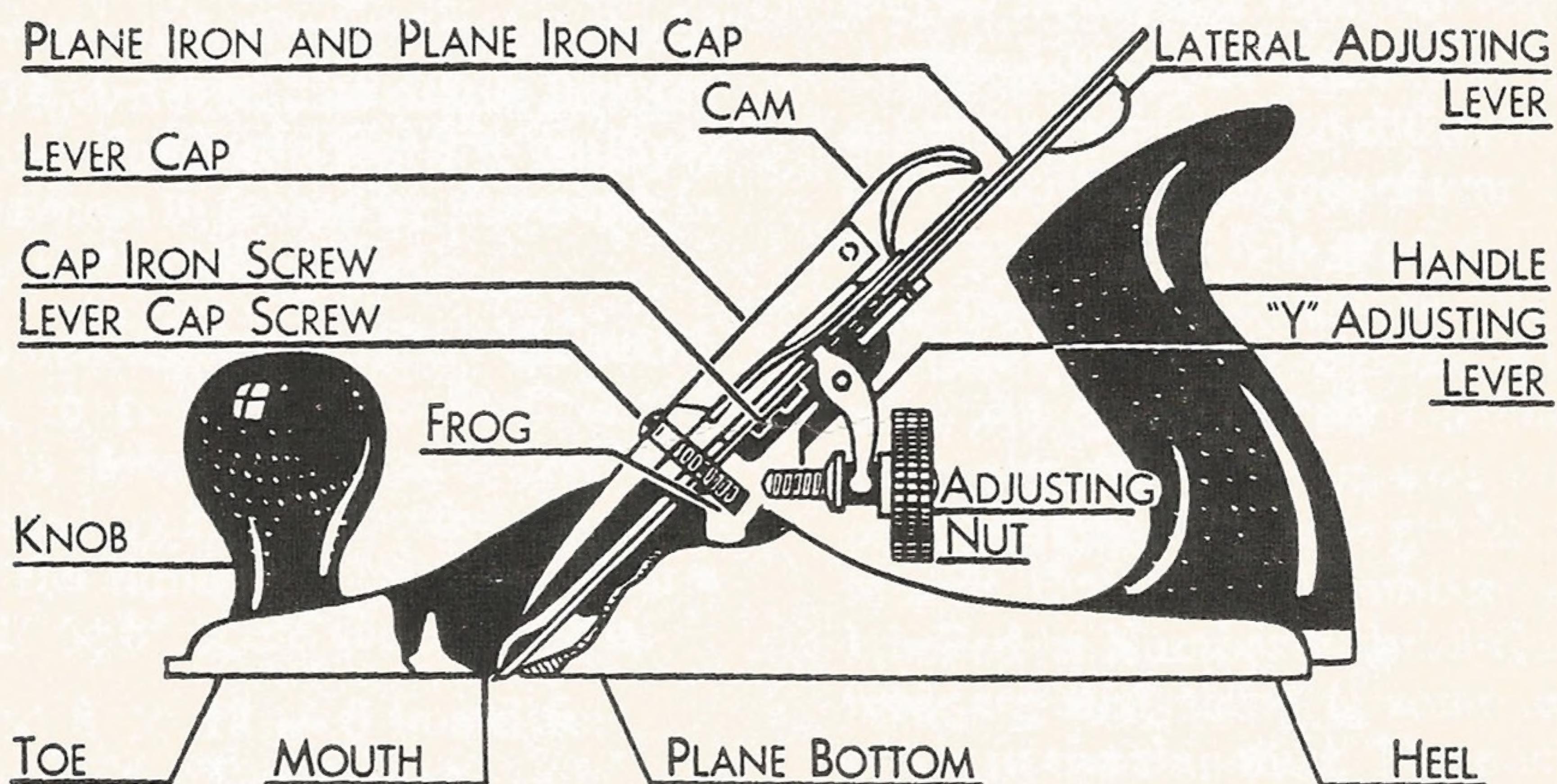
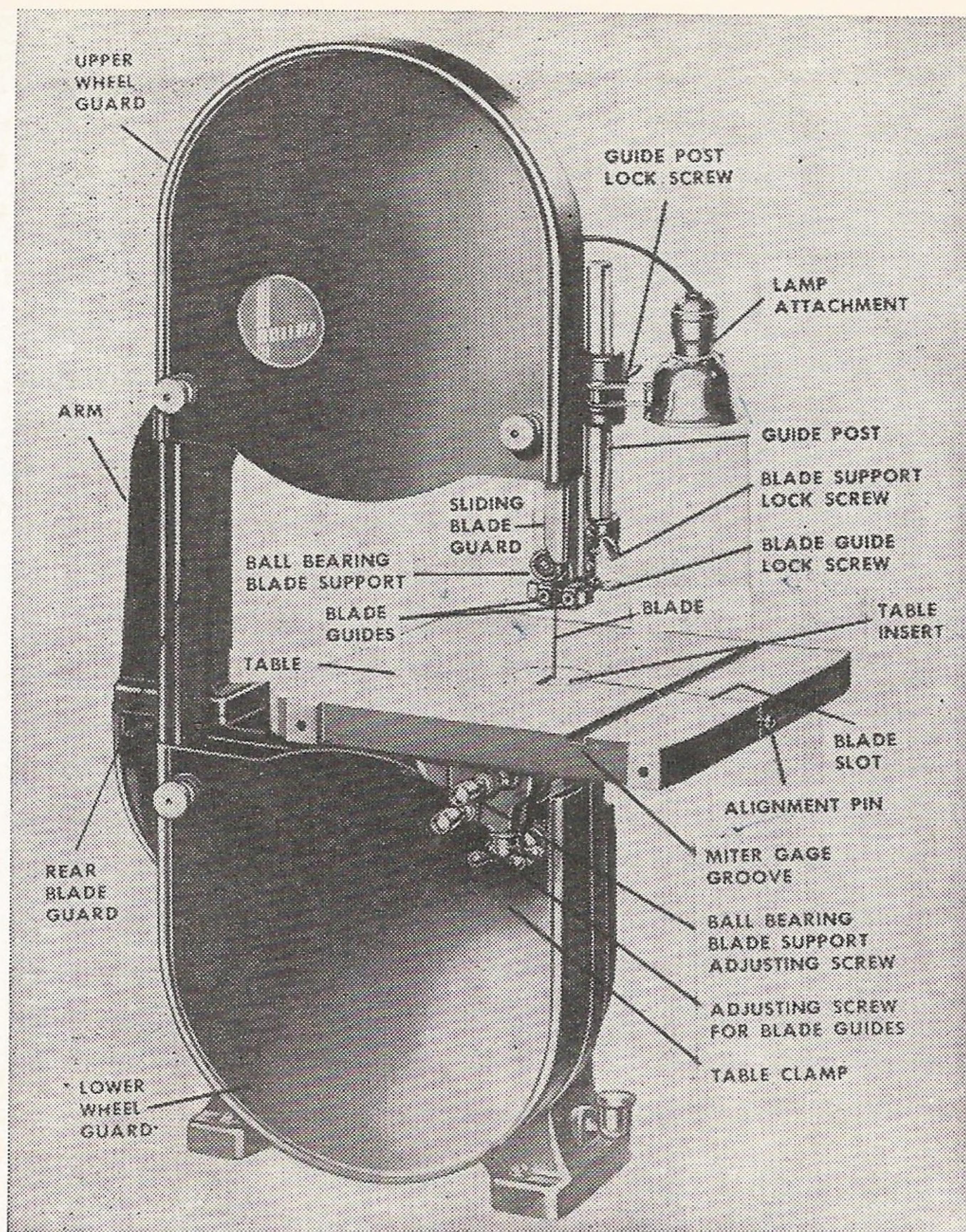


FIG. 58A Plane Parts.

*Courtesy Stanley Tools*



*Delta Power Tool Div., Rockwell Mfg. Co.*

FIG. 165 14" Band Saw.

attempt at using it. However, there are some techniques that will help you to do a still better job.

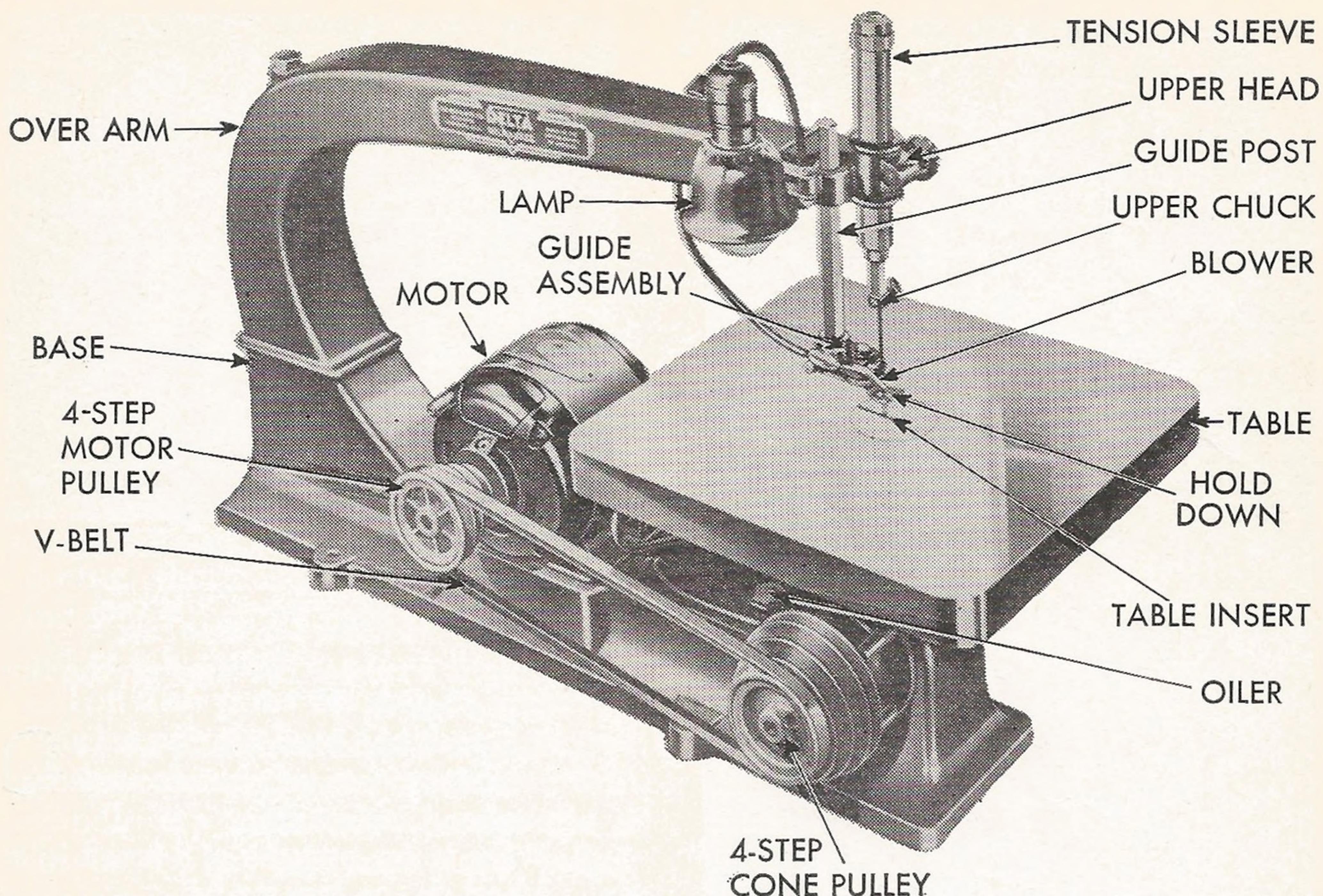
Stand behind the blade and a little to the left. Feed the work with the right hand which is held at the end or far back on the work. The left hand is usually used to guide the work and is held at the edge of the work opposite the blade. The position of the hands will necessarily depend to some extent on the size and shape of the piece to be cut.

Always draw out the shape you wish to cut so that you have a guide

line to follow. Cut on the waste side of this line, leaving the line on the work.

Do not crowd the saw or push the work into the blade too rapidly. Some experimenting will show you the correct speed for smooth and easy cutting.

Guide the work evenly round the curved cuts. The blade cannot turn; consequently the work must be moved. The size of arc that can be cut is determined by the width of the blade; the narrower the blade the smaller the radius that may be cut. A table indi-



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FIG. 169 Jig Saw.

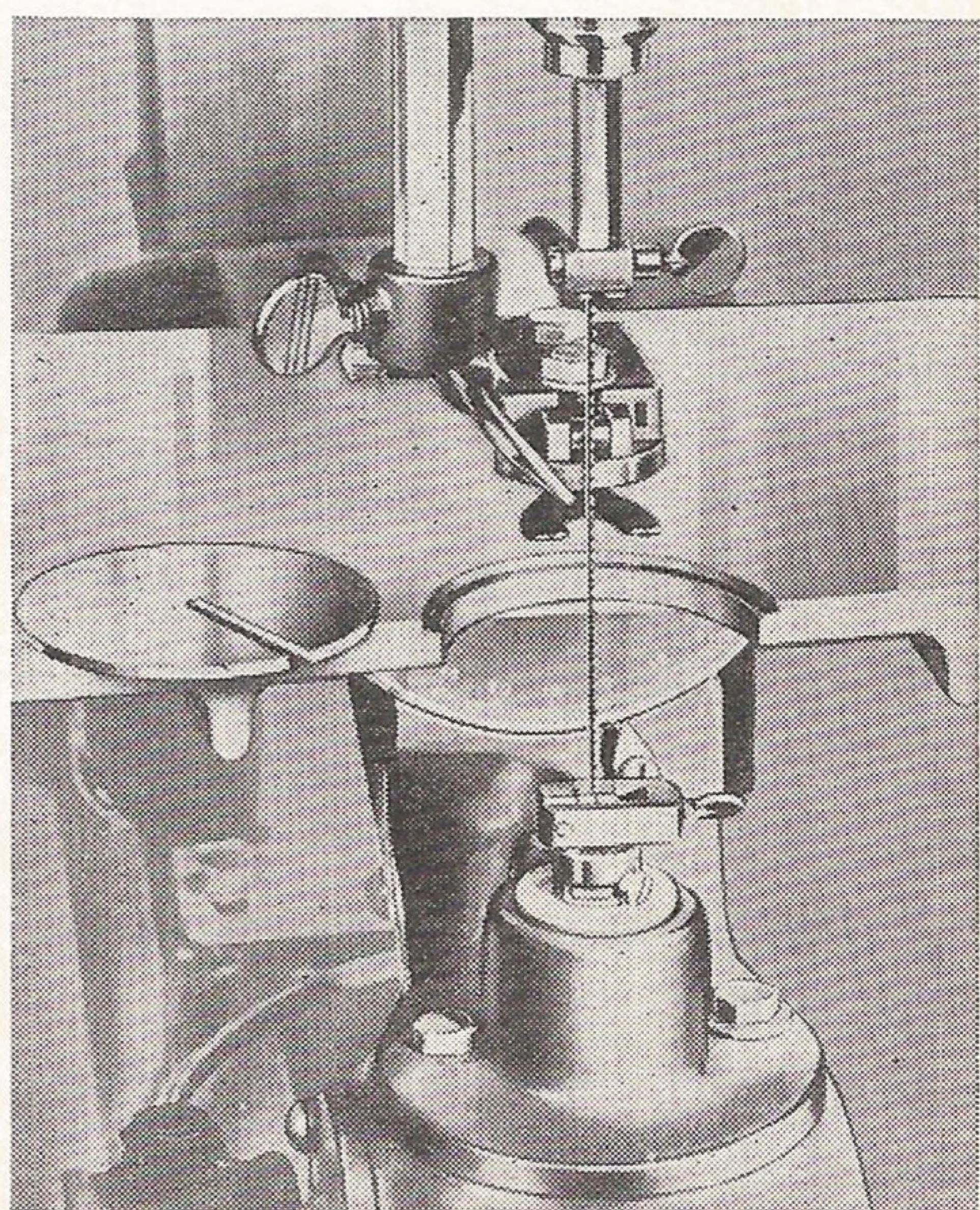
plest woodworking power tool to operate. However, there are a few rules which should be followed:

The spring hold-down should rest on the work, pressing it firmly on the table to prevent the work from bobbing up and down with the action of the blade.

When the blade must be threaded through a hole to make an inside cut, you should release the blade from the upper chuck, and raise the tension sleeve and guide post. This will provide enough space for the work to go over the blade. If a sabre blade is used, it is necessary only to raise the guide post and hold down assembly.

Always have the points of the teeth pointing down so that the blade cuts on the down stroke.

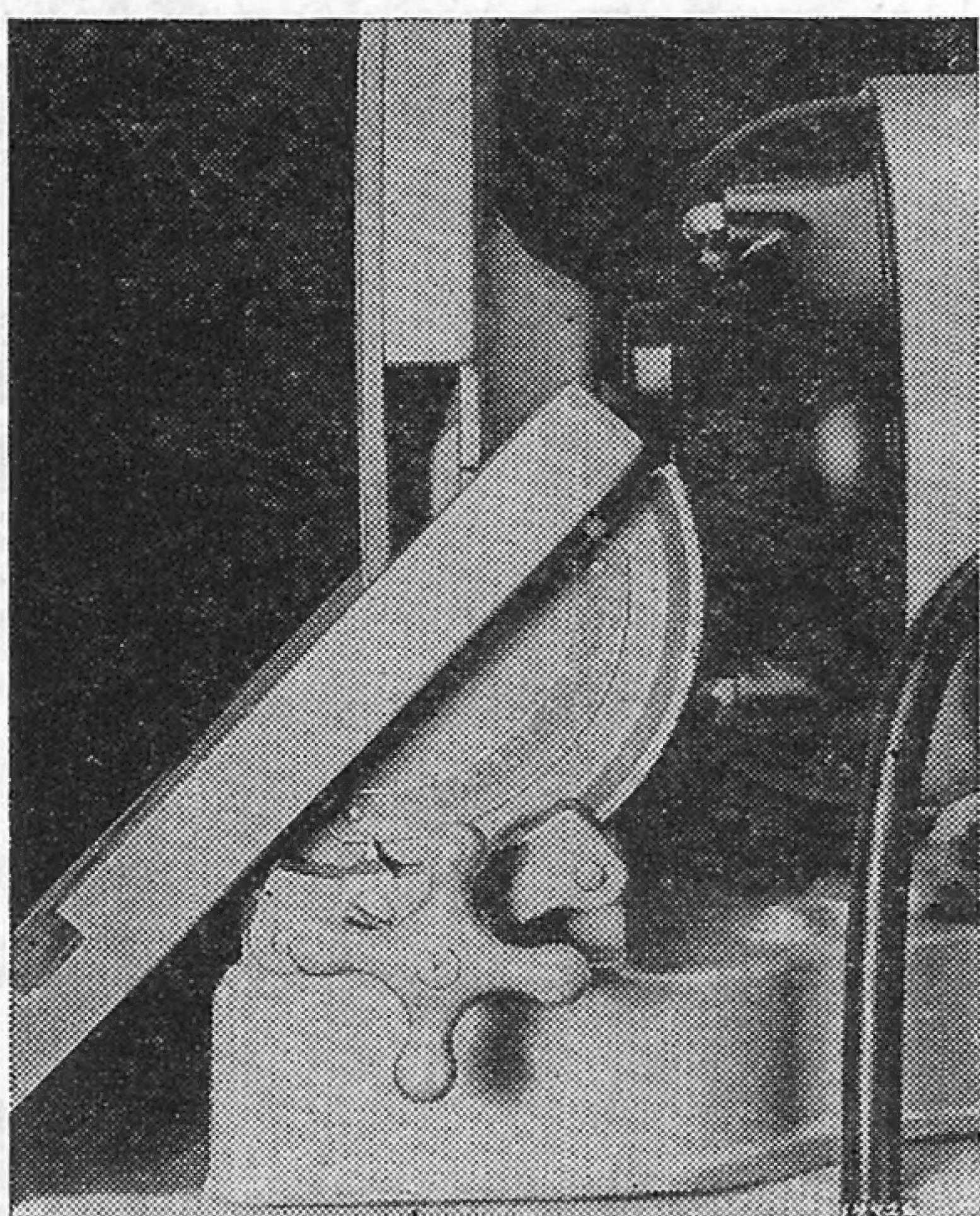
Before starting to saw, it is impor-



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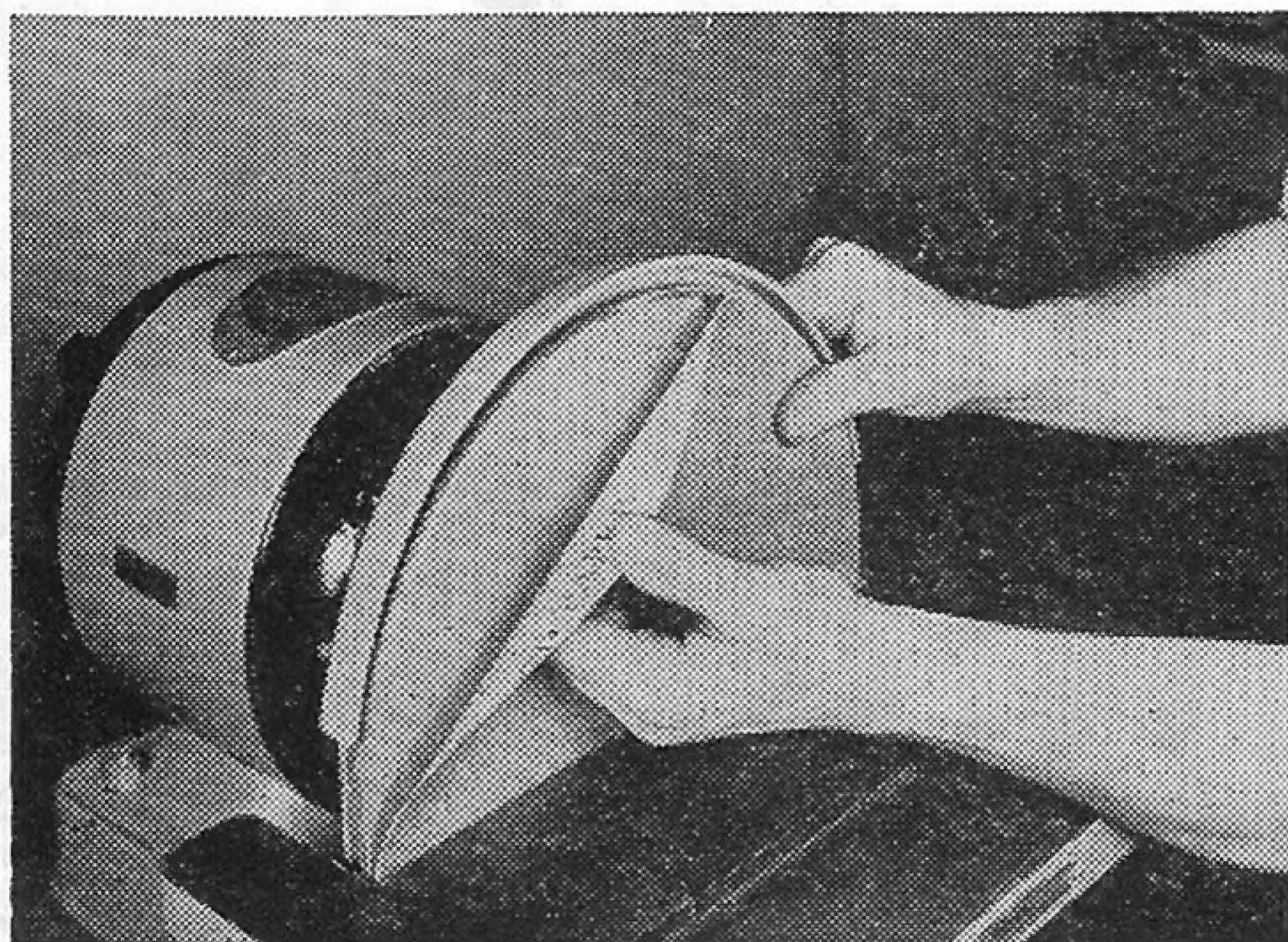
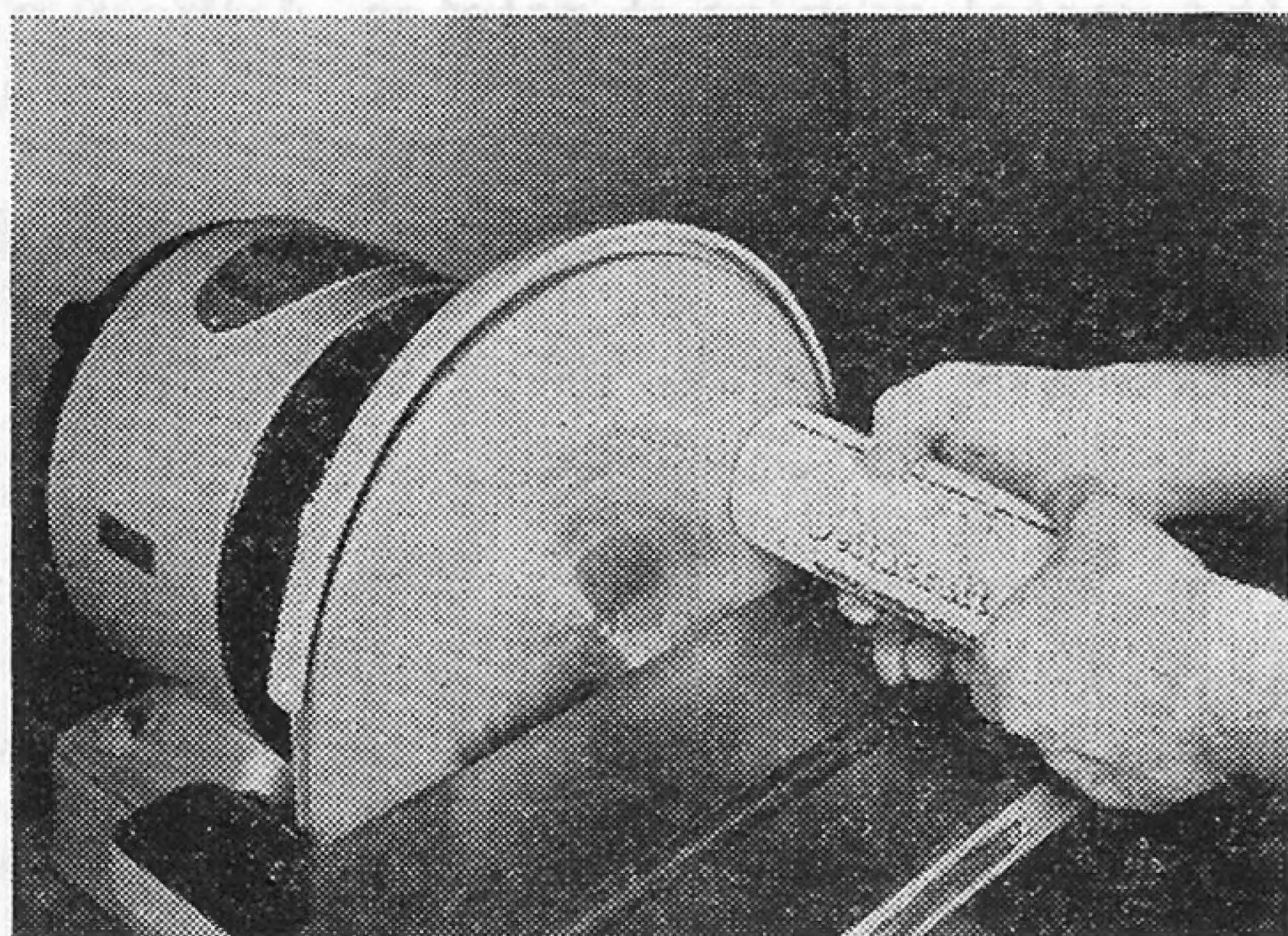
FIG. 170 Jig Saw with Jeweller's Blade.

is also rubbed on the back of the sand-paper which is then applied to the



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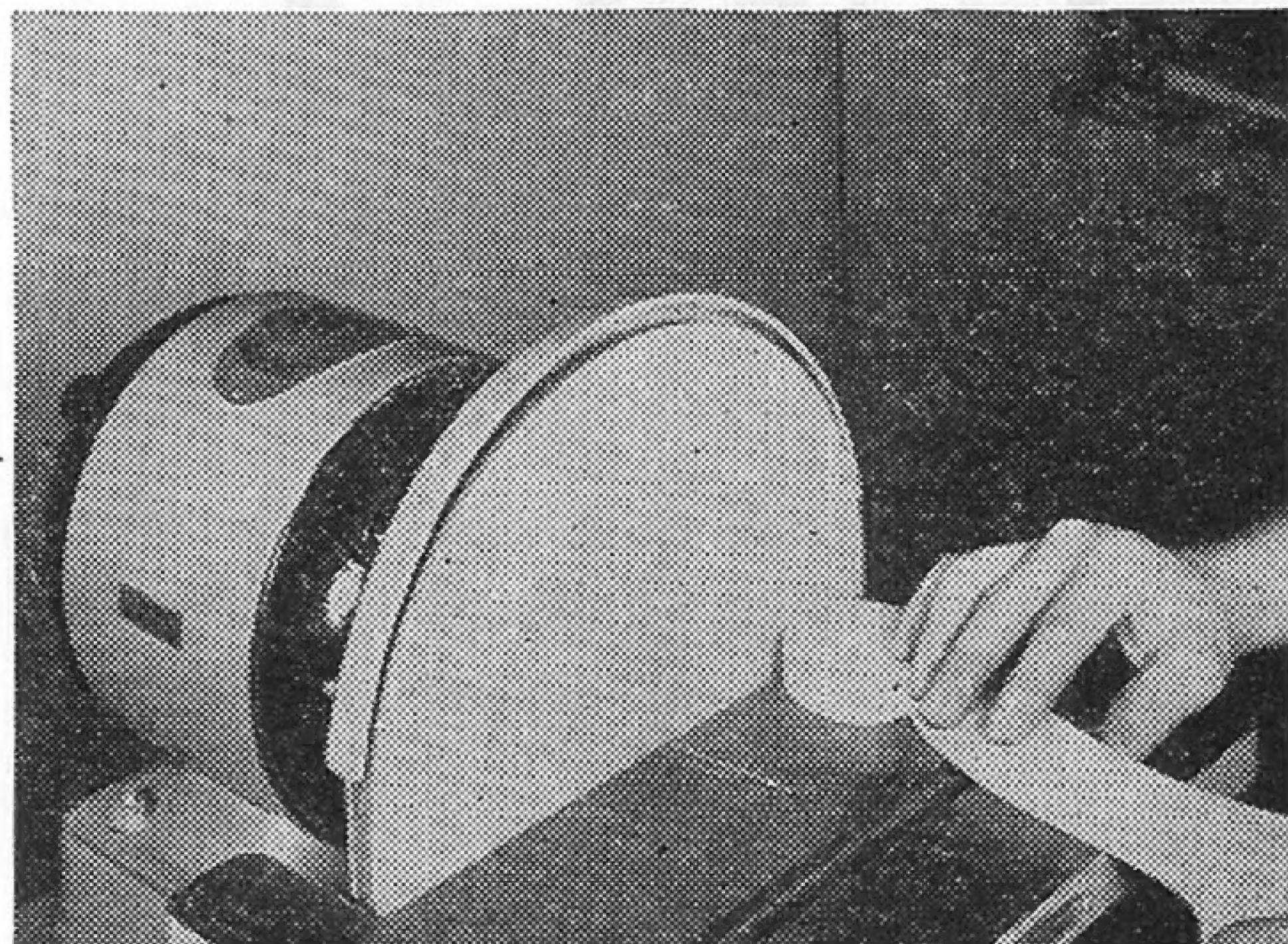
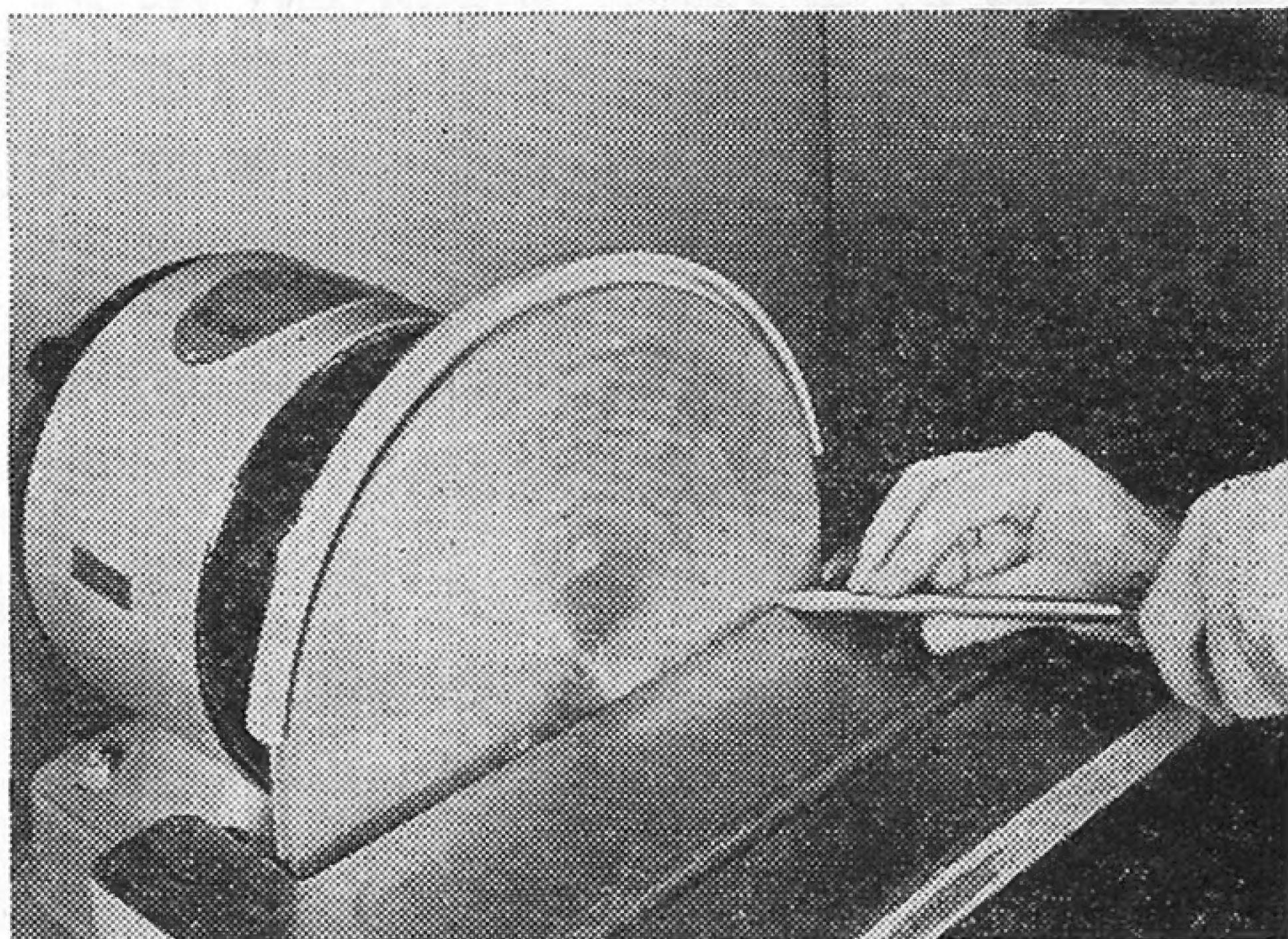
FIG. 199 Sander Table Tilted.



metal; the surfaces stick on contact. The old adhesive must be removed from the metal before the new coating is applied. This procedure is illustrated in Figure 200.

The size of a disk sander is designated by the diameter of the disk, the 12" being the one most commonly used.

Belt sanders are better for many operations than disk sanders because the sanding can be done in the direction of the grain instead of across it or in a circular motion. There are many sizes and types of belt sanders but they all have the same principle of operation. An endless belt of sandpaper runs round two drums, one of which is power driven. Some of them are equipped with a table and mitre



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FIG. 200 Applying Sandpaper Disk to Sander.

## CHAPTER

# 20

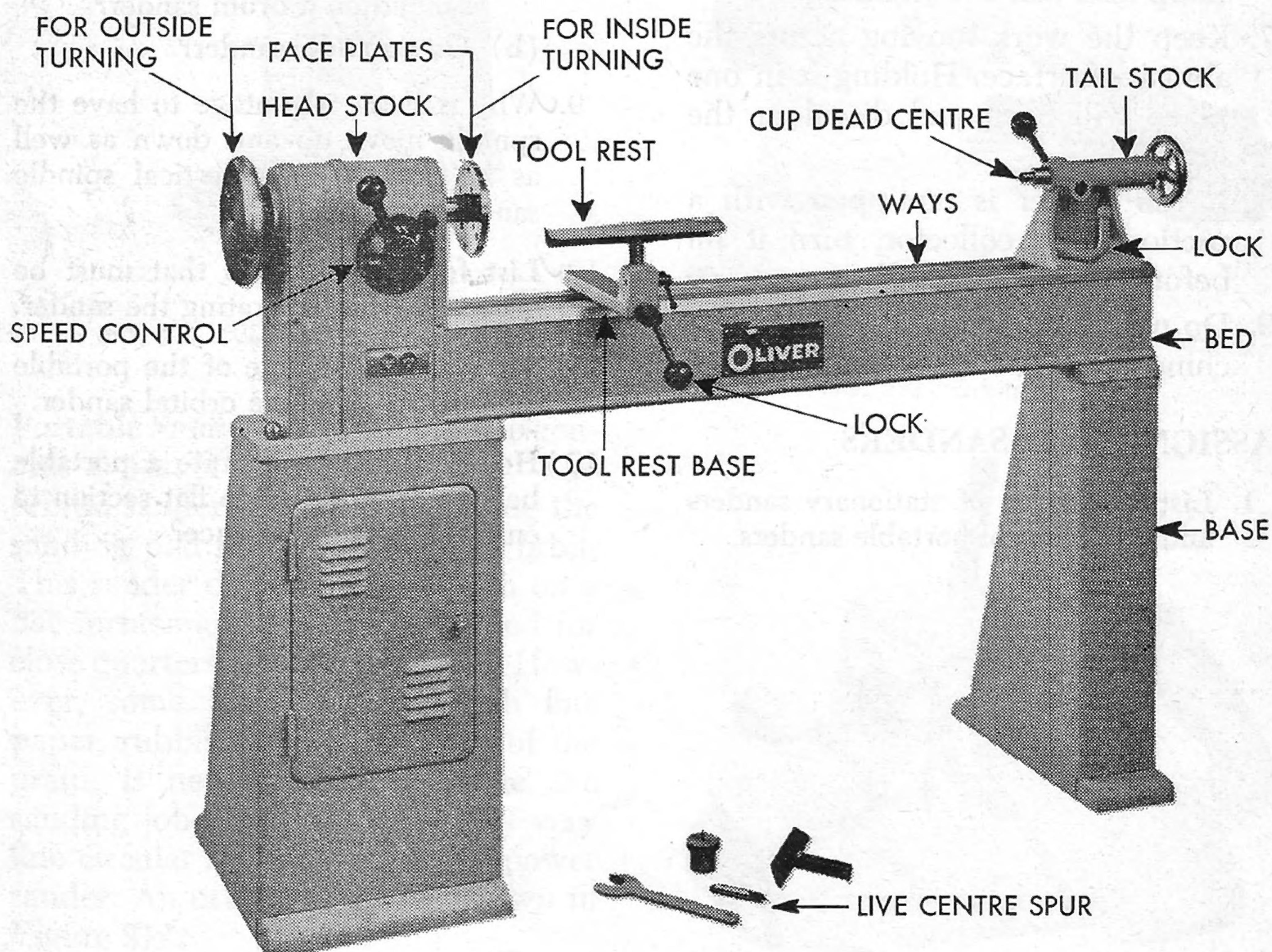
## WOOD LATHE

The wood-turning lathe enjoys a special place among all woodworking machines for several reasons. Invented about 1000 B.C., as a crude hand-operated machine, it is probably the oldest of all furniture-making and craft machines. The lathe combines the art of hand tool work and the mechanical operation of a modern machine, and may be considered as a complete unit in itself on which a complete project

may be made without the aid of other machines or tools.

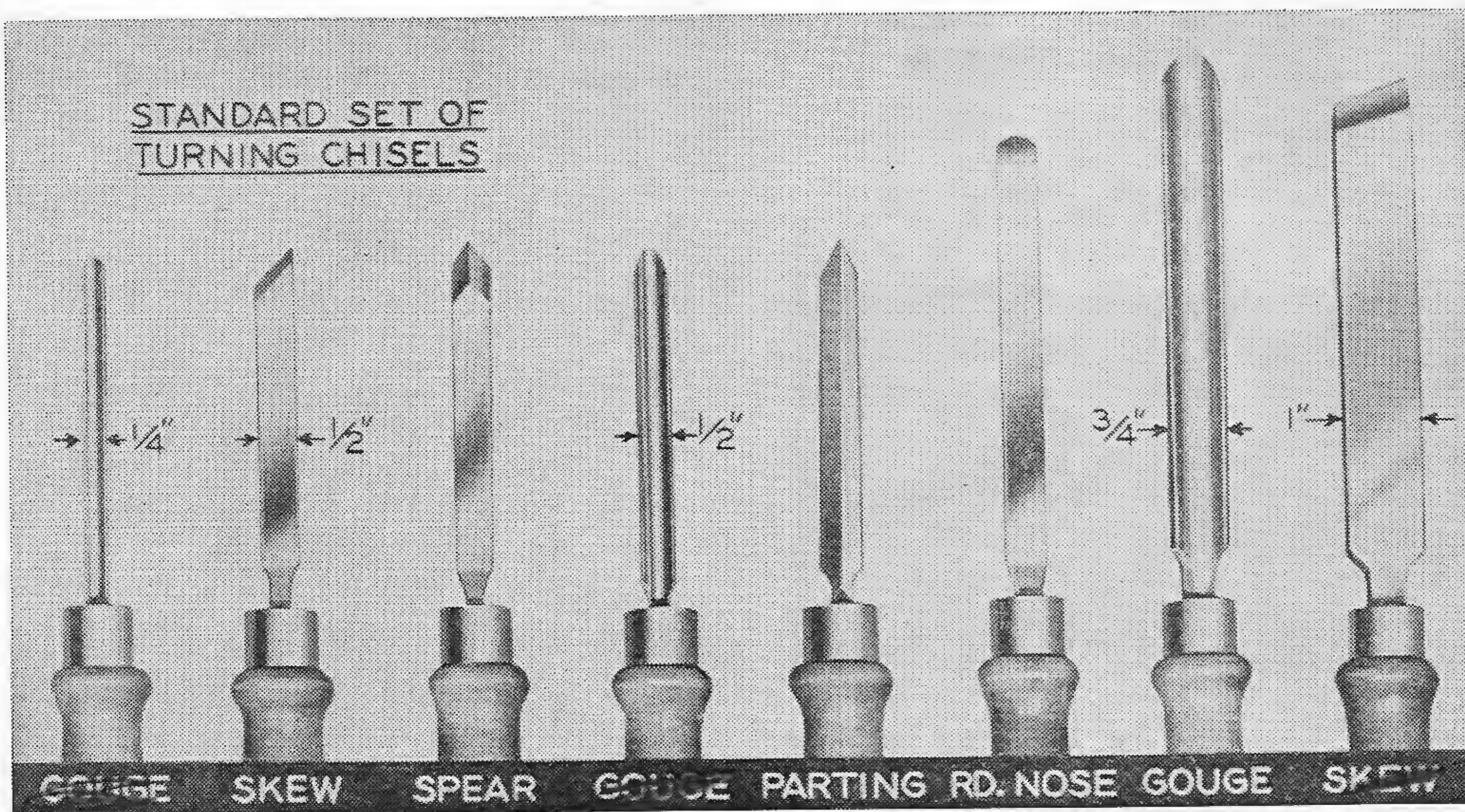
Other woodworking machines we have used have revolving knives or blades that pass over or through the work. The lathe works in reverse; the work is revolved and the chisels are held more or less stationary.

The lathe is not a difficult machine to operate. However, the ability to produce good turnings quickly and accu-



*Oliver Machinery Co.*

FIG. 214



*Delta Power Tool Div., Rockwell Mfg. Co.*

FIG. 229

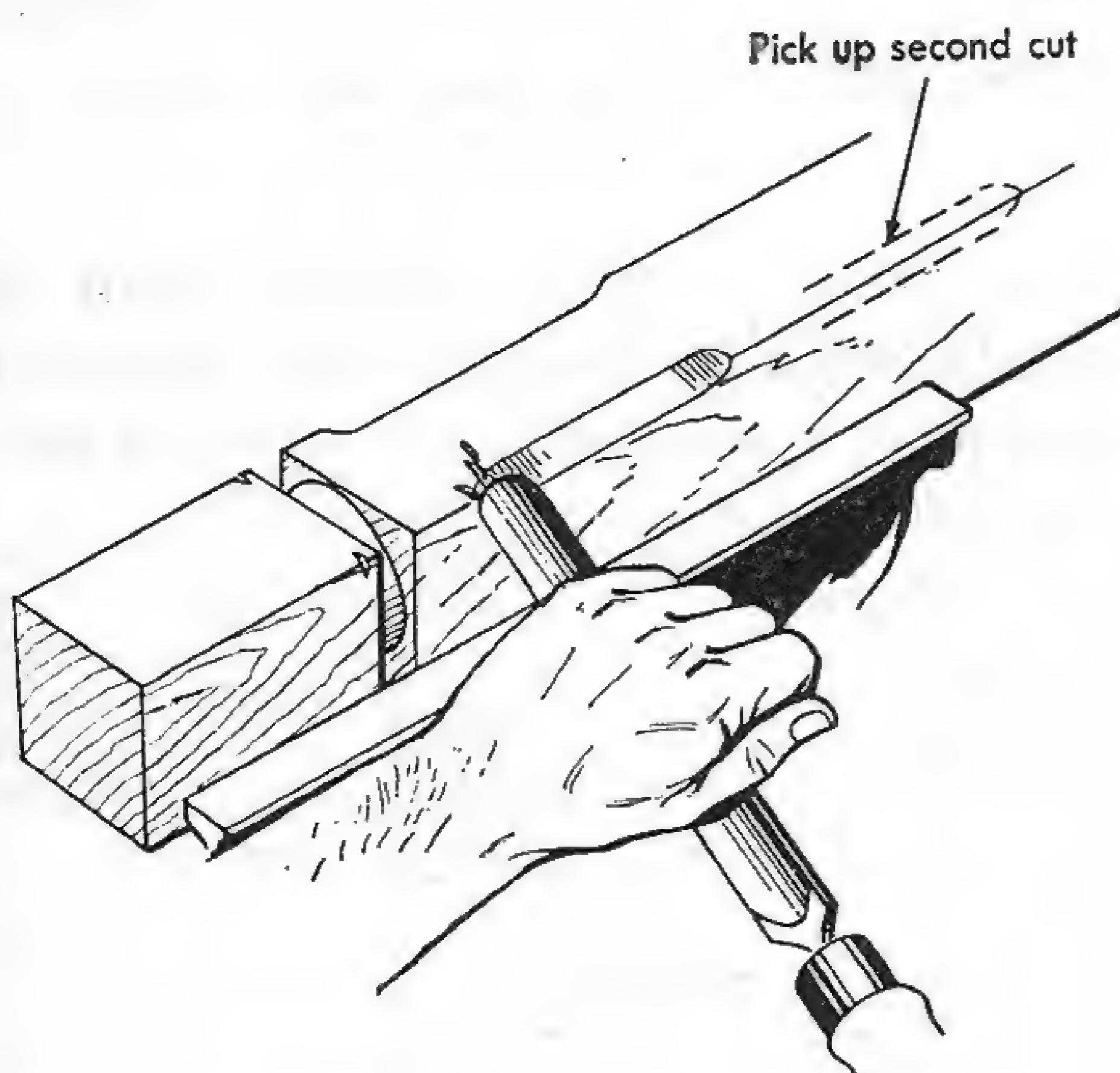


FIG. 230 Rough Turn with Gouge.

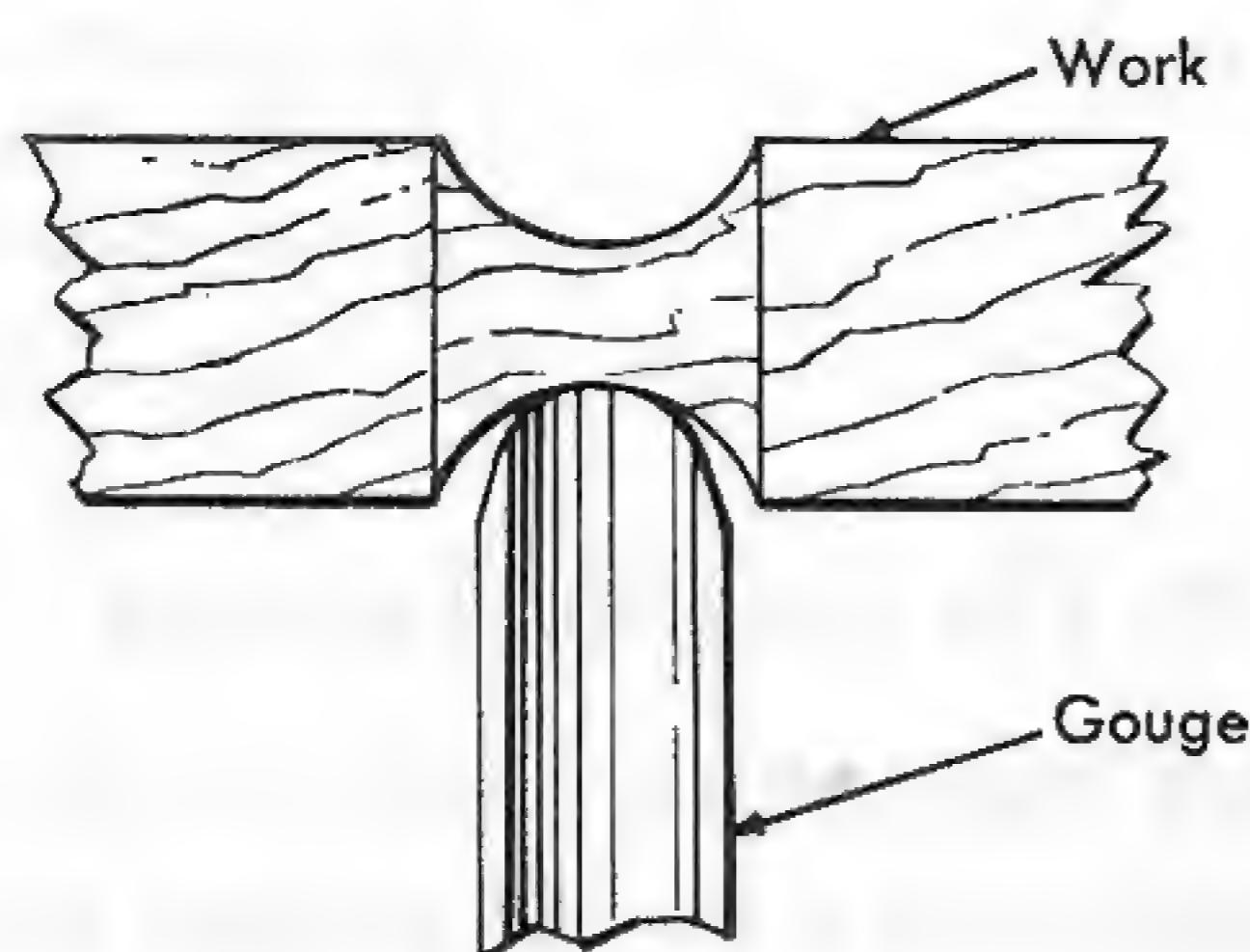
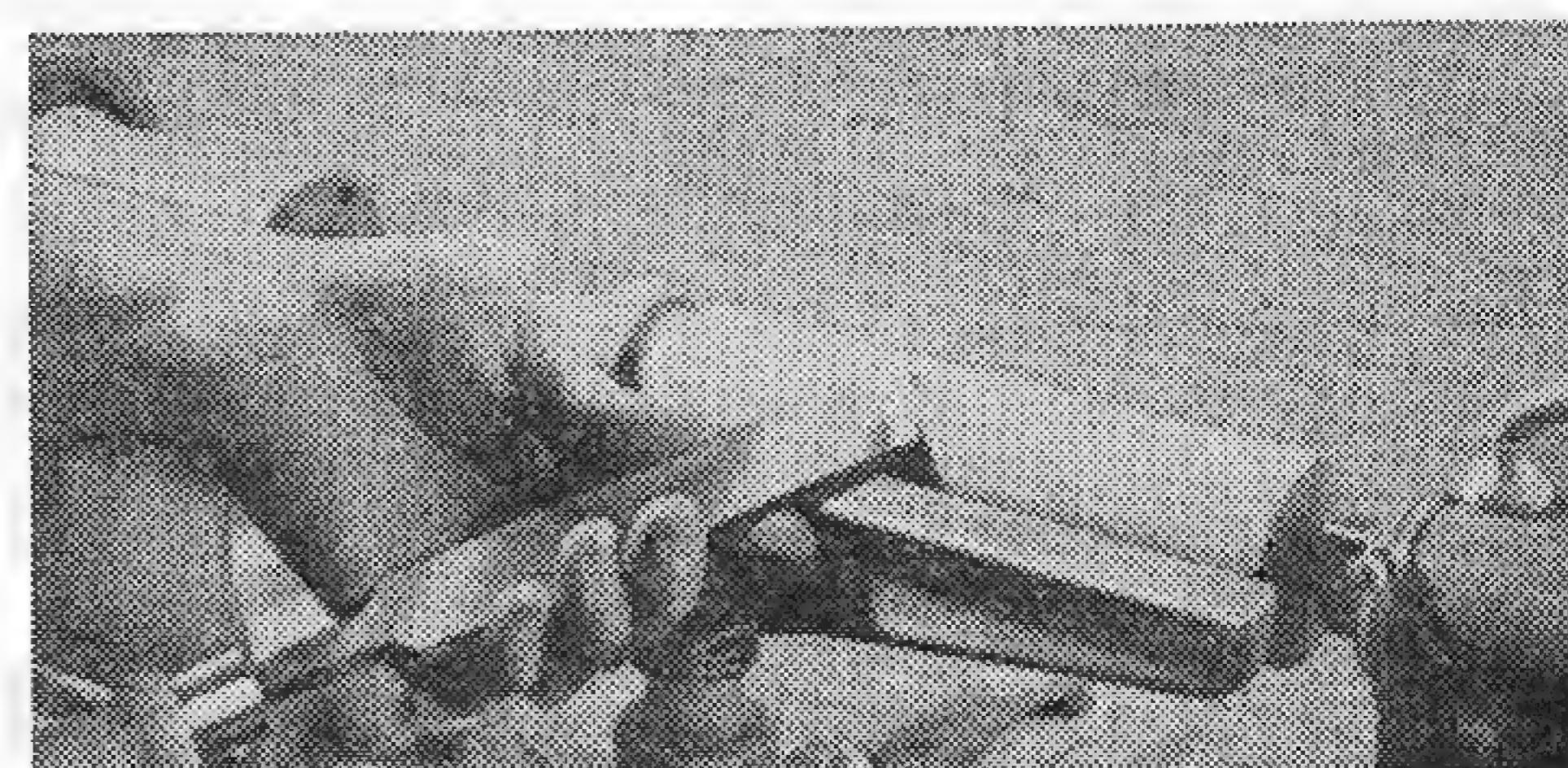


FIG. 231

The skew is probably the most useful and versatile of all wood-turning tools. It can be used for many operations. One of these is to bring a cylinder to exact size after it has been rough-turned with the gouge. This should be done with a shearing cut by holding the chisel at an angle as shown in Figure 232. Start the cut an inch or two in from the end, and work toward either end. To be able to make a good shear cut with the skew tipped at this angle takes considerable skill and may require practice and effort. The cutting of shoulders, V's, beads



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FIG. 232

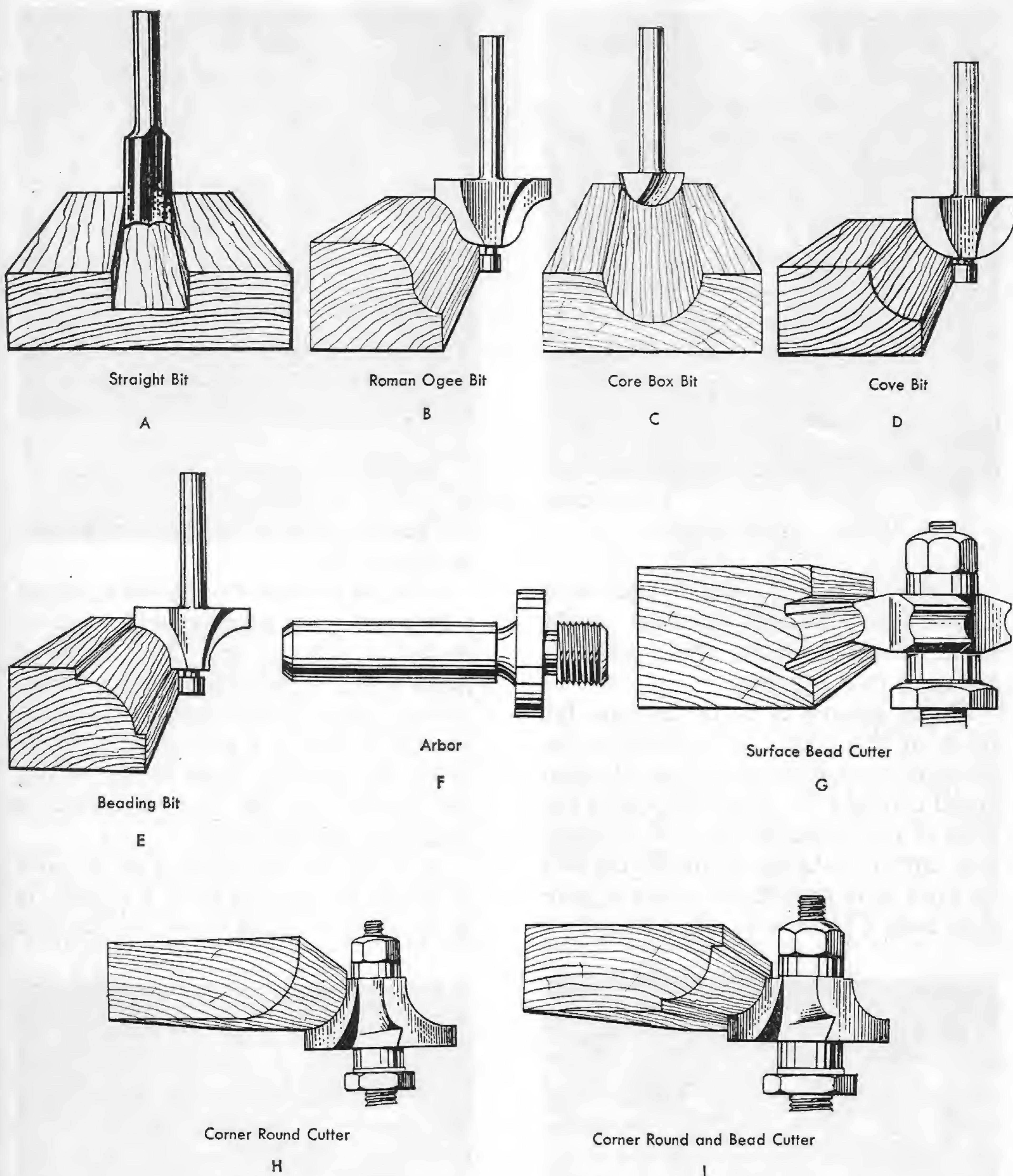
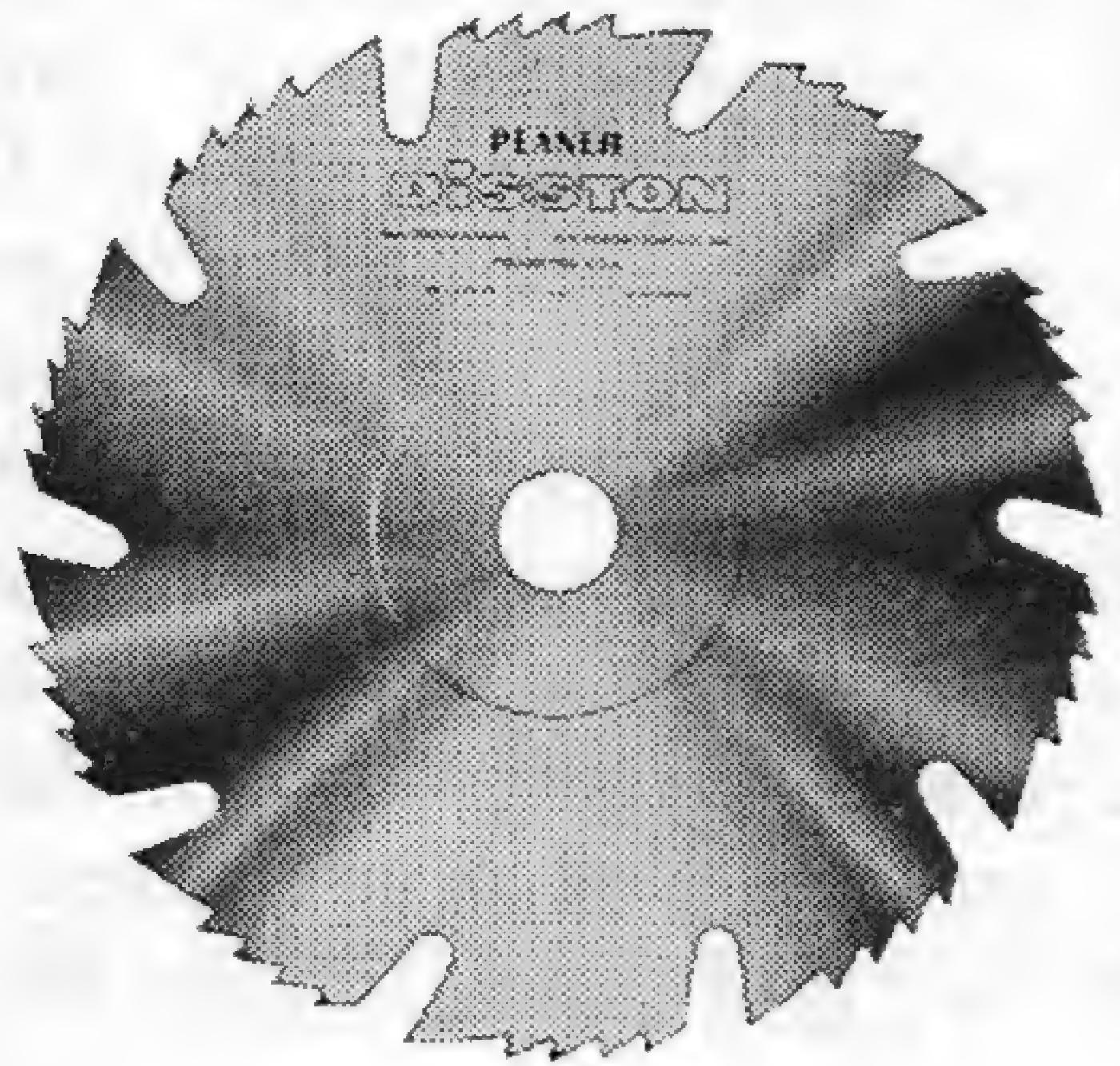


FIG. 245 Some of the Many Bits Available.

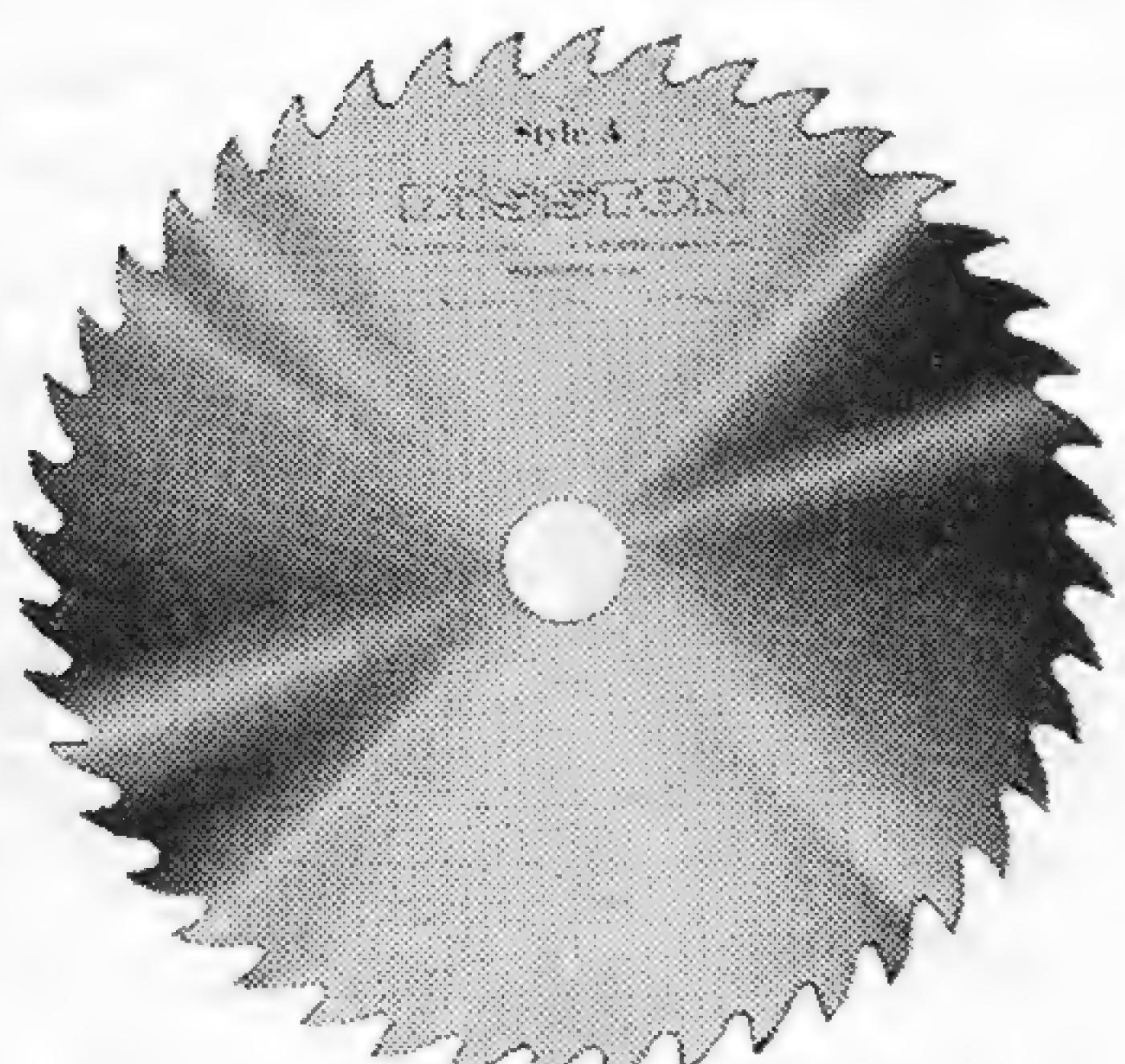
Router bits such as the ones shown in Figure 245 (A and B) have no pilot on the end of them as they are made to cut a groove which is not at

the edge of the work. When using this type of bit in a router you must use a guide. An adjustable guide, shown in Figure 247, is used for straight edges.

on which the blades are mounted. The tilting arbor or blade is generally considered to be the better saw. Some saws have a double arbor with two saw blades — one a rip saw, the other a cross-cut. Either saw can be turned



Combination Blade.



Rip-saw Blade.



H. K. Porter Co. (Canada) Ltd.

Cut-off or Cross-cut Blade.

FIG. 275

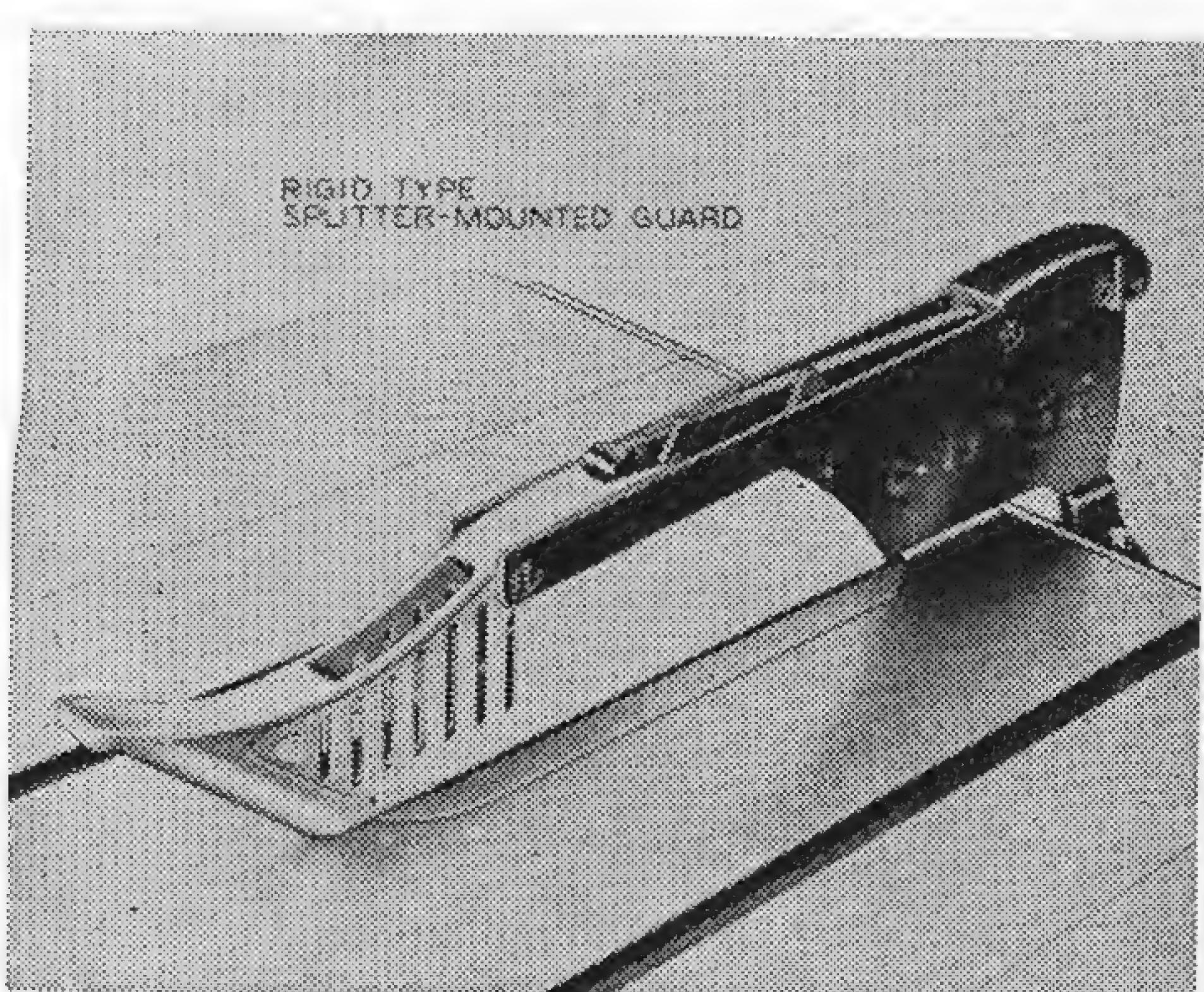
up so it is above the table, while the other is below. A tilting arbor saw is shown in Figure 274.

Some of the many operations that can be performed on the variety saw are cross-cutting, ripping, bevelling, grooving, dadoing, and chamfering.

Types of blades commonly used are shown in Figure 275.

To cut easily and operate efficiently, saw blades must rotate at the correct speed. The larger the diameter of the blade, the greater the rim speed per minute for a given R.P.M. Large production saws have large diameter blades and a faster rim speed than the smaller bench saws. This allows the work to be fed faster and still produce a smooth cut. An 8" blade should rotate at 3400 R.P.M. giving it a rim speed of 7100 feet per minute. A 10" blade should rotate at 3100 R.P.M. giving it a rim speed of 8100 feet per minute, while a 12" blade (the size used in most school shops) generally rotates at 3400 R.P.M. giving it a rim speed of 10,000 feet per minute.

For most cutting operations the blade should be covered with a guard. Most guards can be easily removed or



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FIG. 276

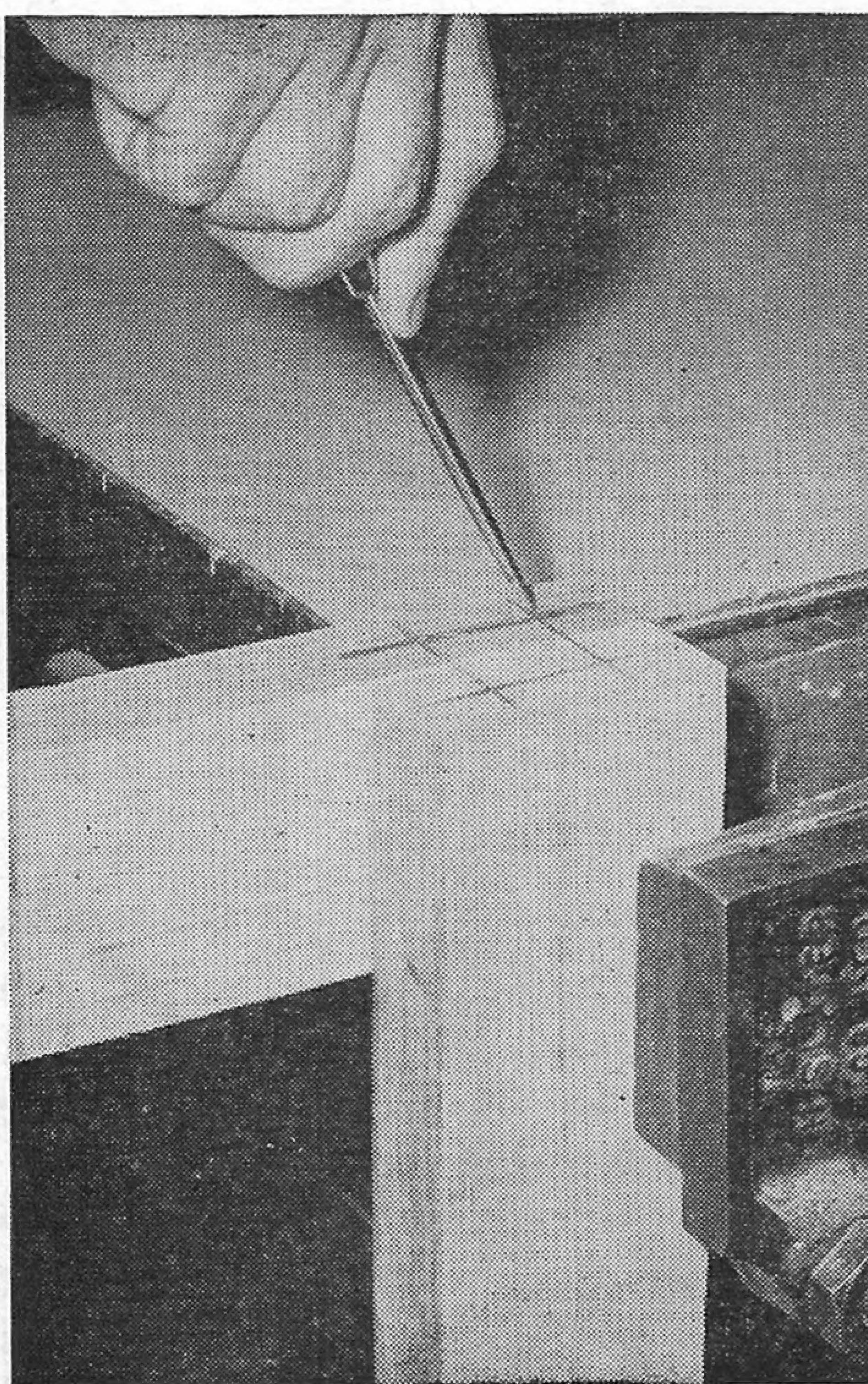


FIG. 334 Laying out an End-to-edge Dowel Joint.

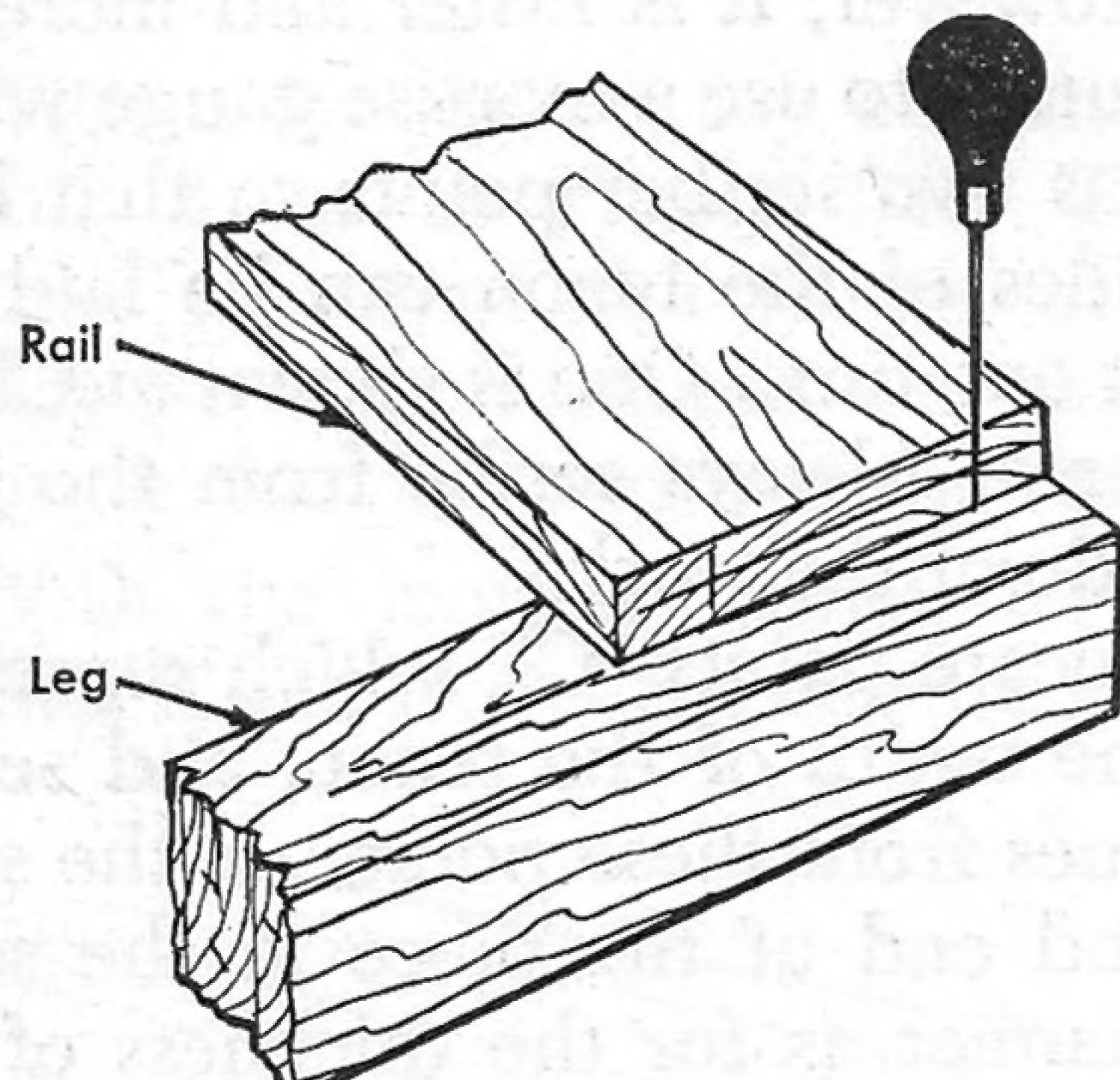


FIG. 335 Rail-to-leg Dowel Joint.

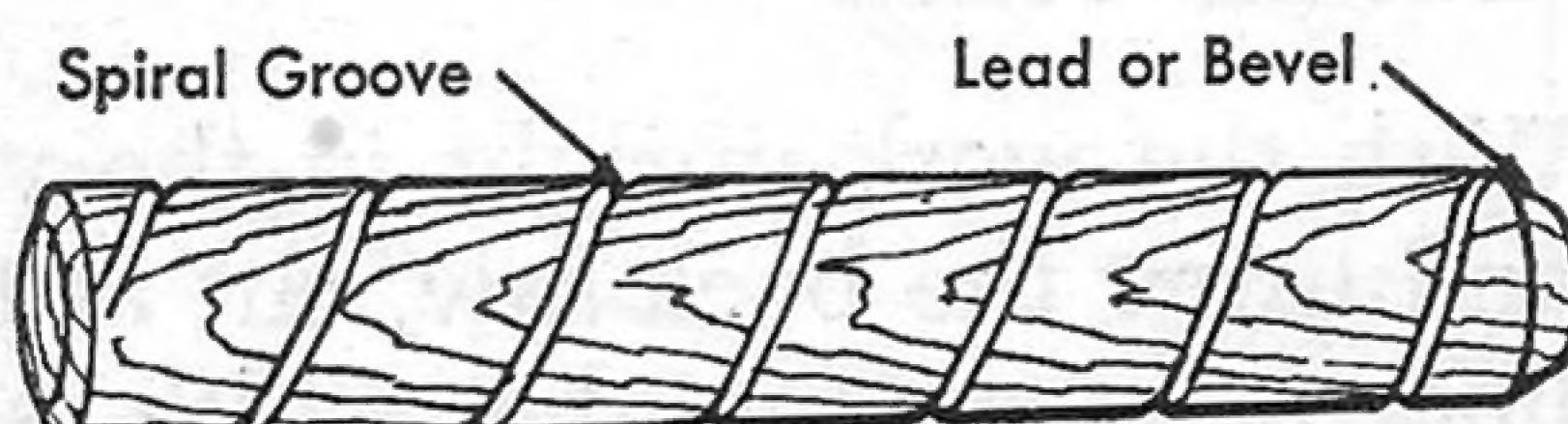


FIG. 336 Dowel.

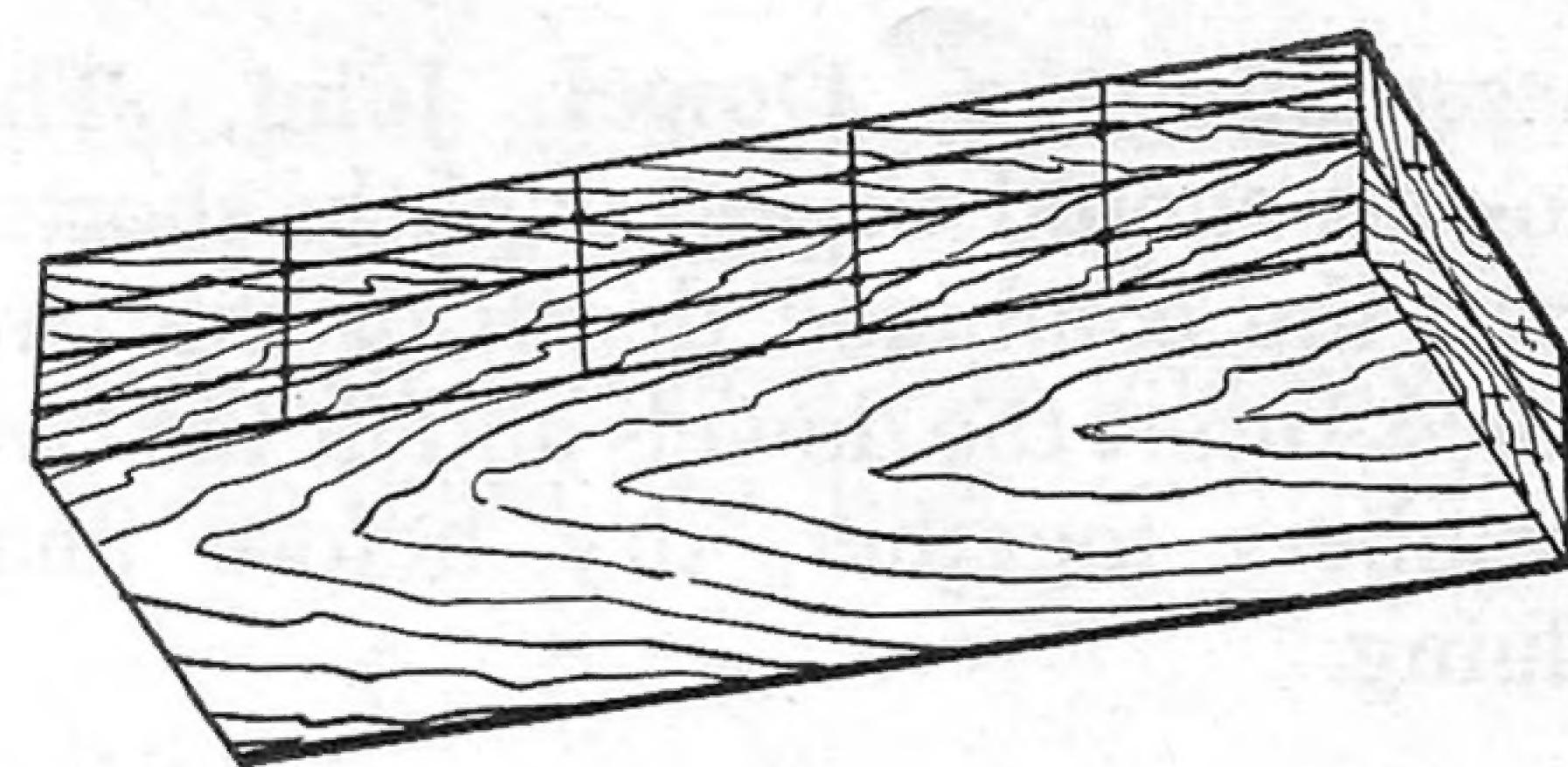


FIG. 337 Dowel Location for Edge-to-edge Joint.

using a dowelling jig which, if properly set on the work, ensures that the holes will be correctly located and bored at a right angle to the face of the work. Figure 339 illustrates one of these dowelling jigs.

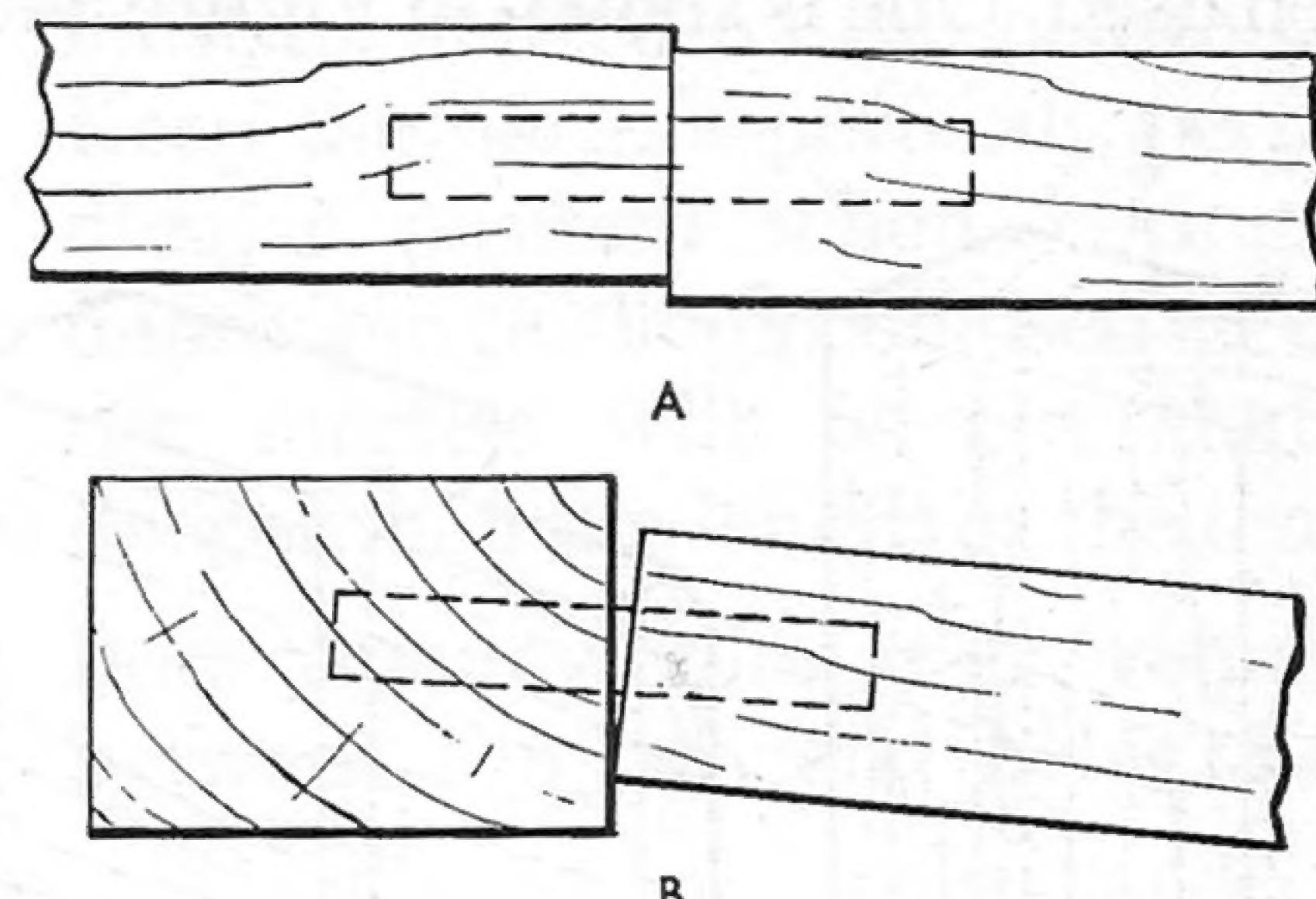
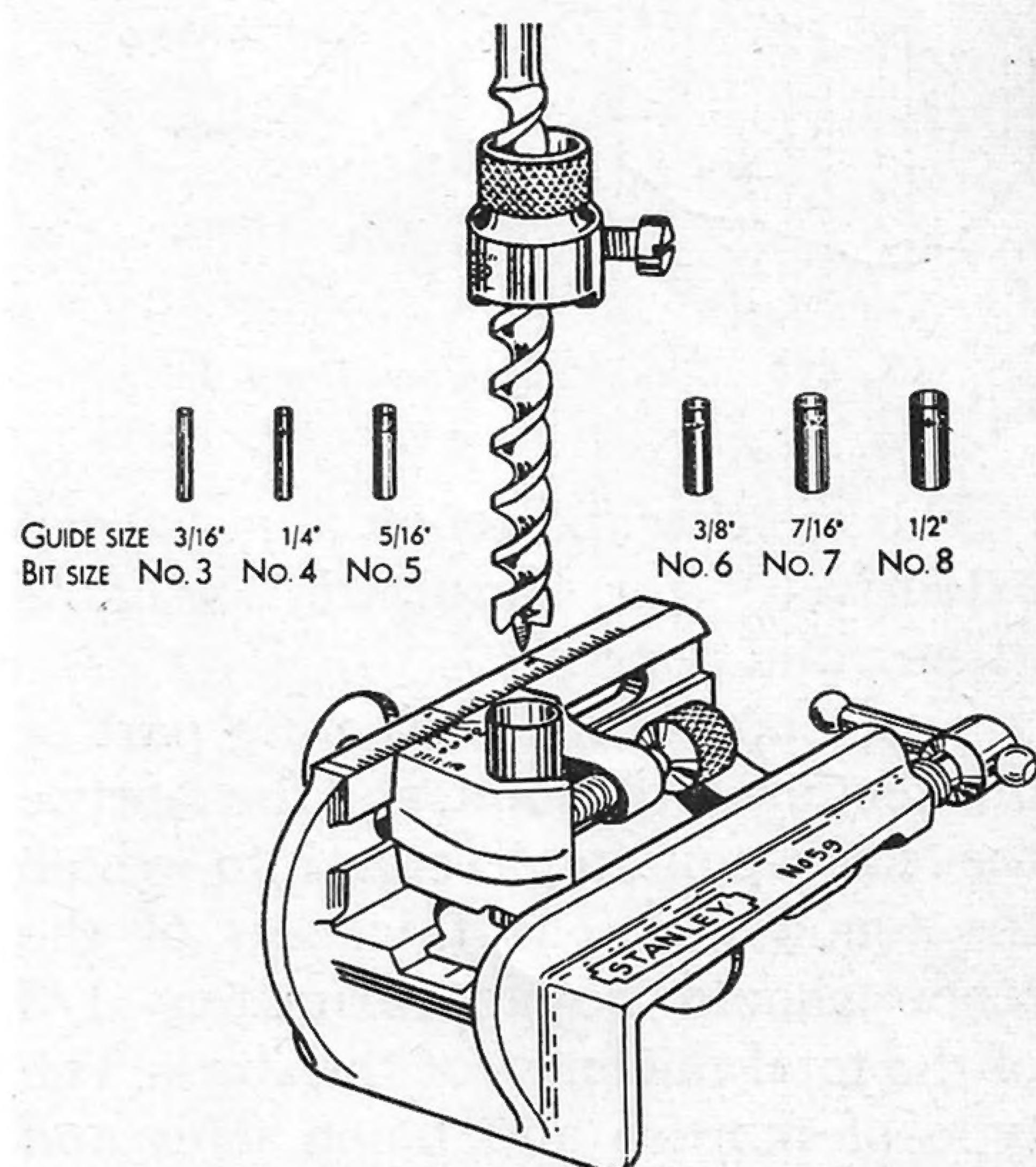


FIG. 338 The Result of Poor Alignment of Dowels.



Courtesy Stanley Tools

FIG. 339 Dowelling Jig.

## CHAPTER

# 26 SCRAPING, SANDING AND PREPARATION FOR FINISHING

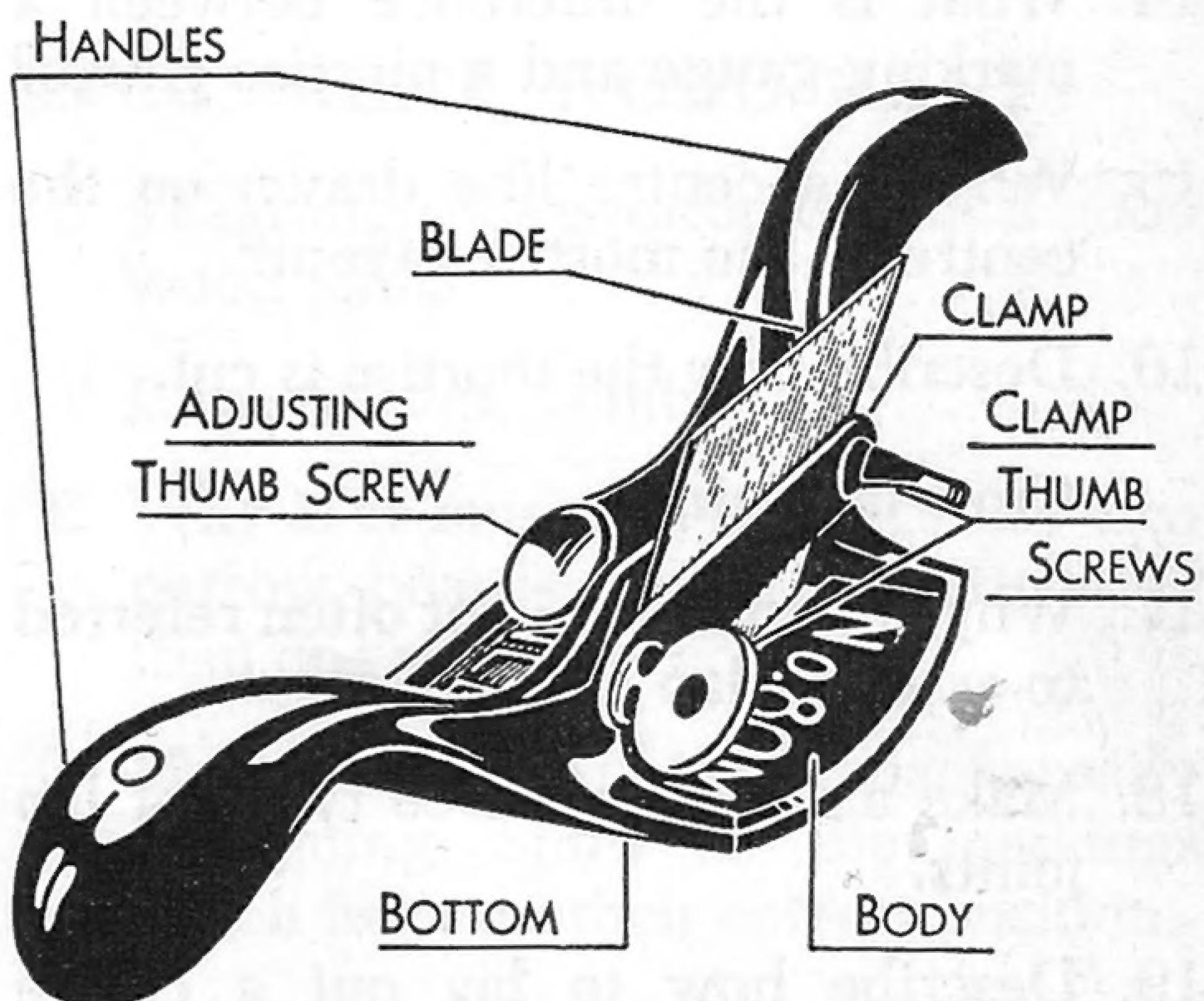
It is impossible to obtain a good finish on work unless it has been properly prepared. There are many types of finishes which may be used, but none of them are made to cover poor workmanship. In fact the finish will magnify the defects; scratches or other marks which may be undetected or only slightly visible on the bare wood will show up as noticeable blemishes on the finished work.

Successful finishing begins with having the work properly sanded and free from dents, scratches, chips or other imperfections. Some dents can be removed by placing several thicknesses of wet cloth over them, then pressing a hot iron on the cloth, keeping the iron moving so as not to scorch the work. The steam created swells the wood fibres and brings them back to their original position. This process may have to be repeated several times to raise the dent completely. The spot can be sanded when dry. All nails should be set below the surface but should not be filled until one coat of finishing material has been applied. If they are filled first, the oil from the filler soaks into the wood and the filler falls out. However, if a protective coat is first spread on the work to seal the wood fibres, the filler will remain in place.

You should take enough time to do a good job of cleaning and sanding. Having spent hours to make a project you would be wise to spend a little more

time in scraping and sanding so that a worthwhile finish can be obtained.

**Scrapers.** Scrapers are wood-smoothing tools which make a finer cut than the plane. They are used just prior to sanding to remove plane marks and other defects too small to plane off but too deep to sand out.



Courtesy Stanley Tools

FIG. 377 Cabinet Scraper.

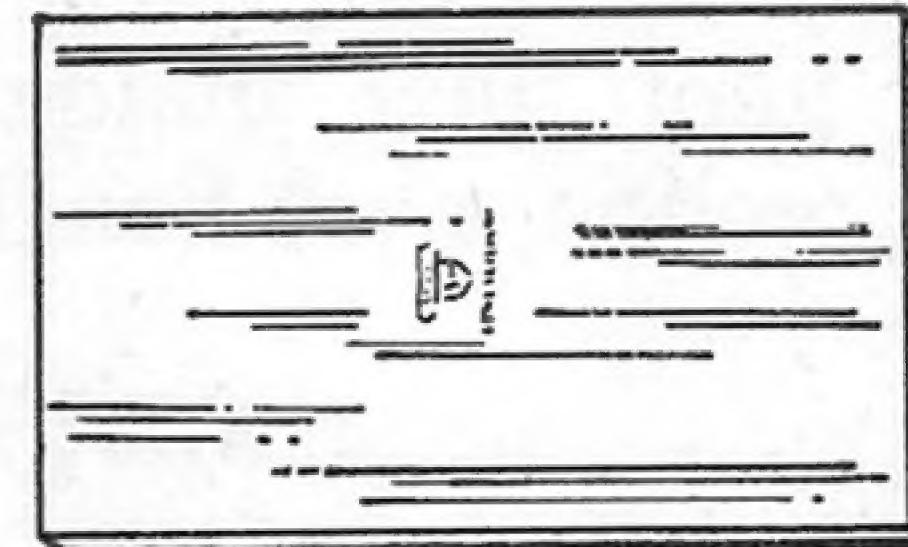


FIG. 378 Hand Scraper.



FIG. 379 Scraper Plane.

of the honing is done at the cutting edge. The blade may be moved back and forth the full length of the stone or it may be moved in a circular direction (see Figure 391). After a few strokes on the bevelled side of the blade, turn it over so the back is flat on the stone. Give the blade a few strokes on the back, making sure not to raise the end. There should be absolutely no bevel on this side of the

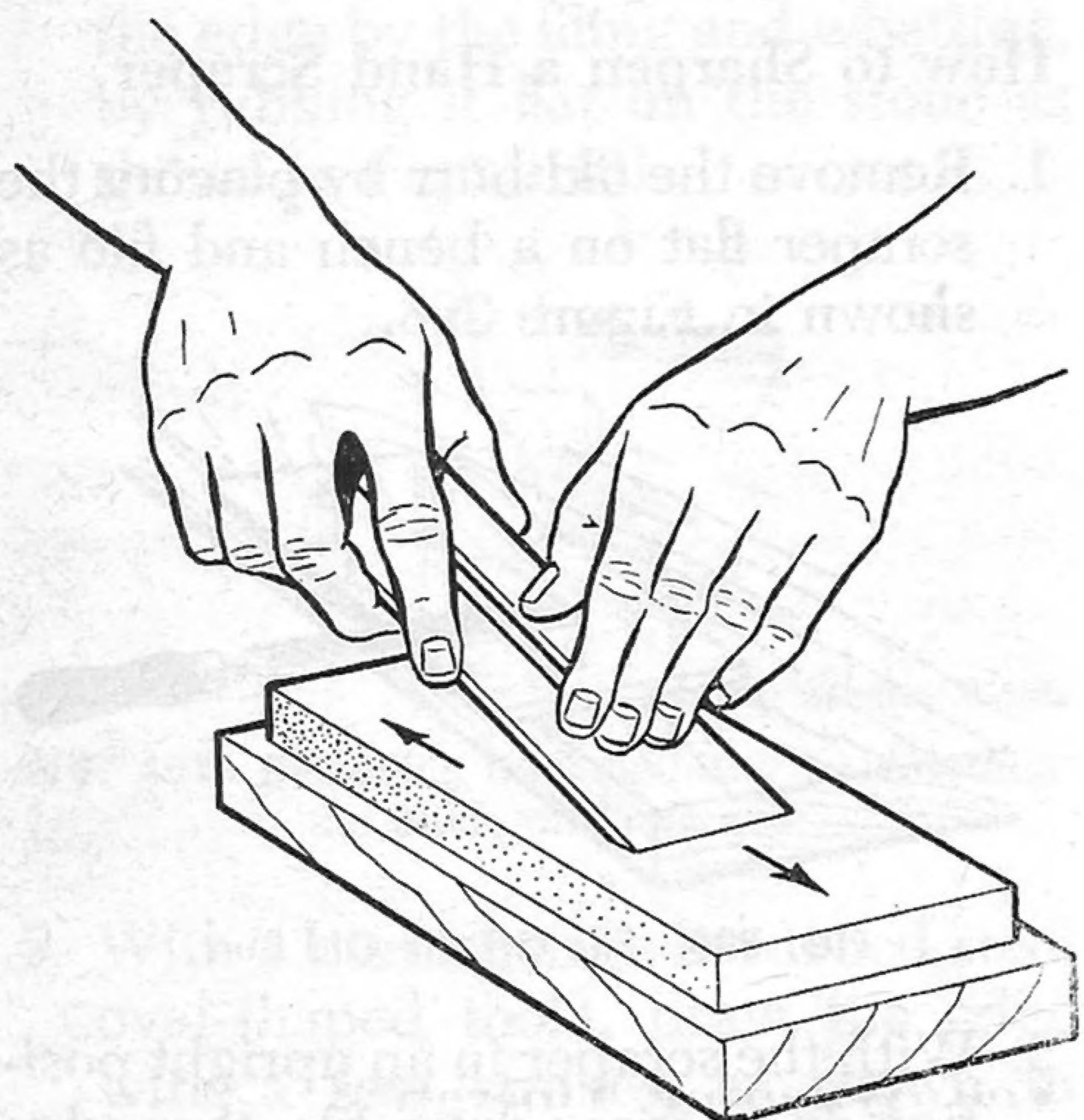


FIG. 391

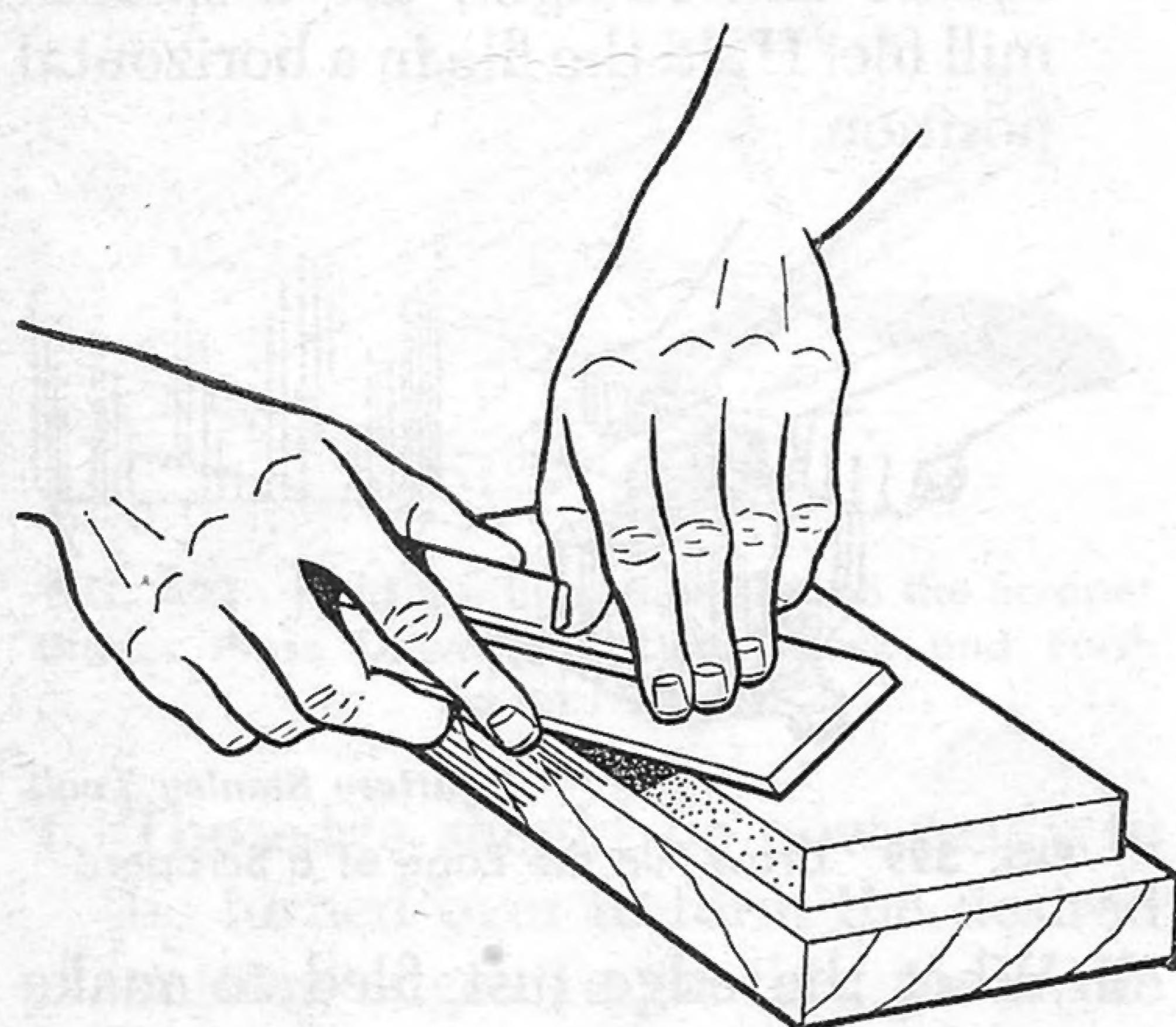


FIG. 392

Repeat these Two Operations Until the Feather Edge is Removed.

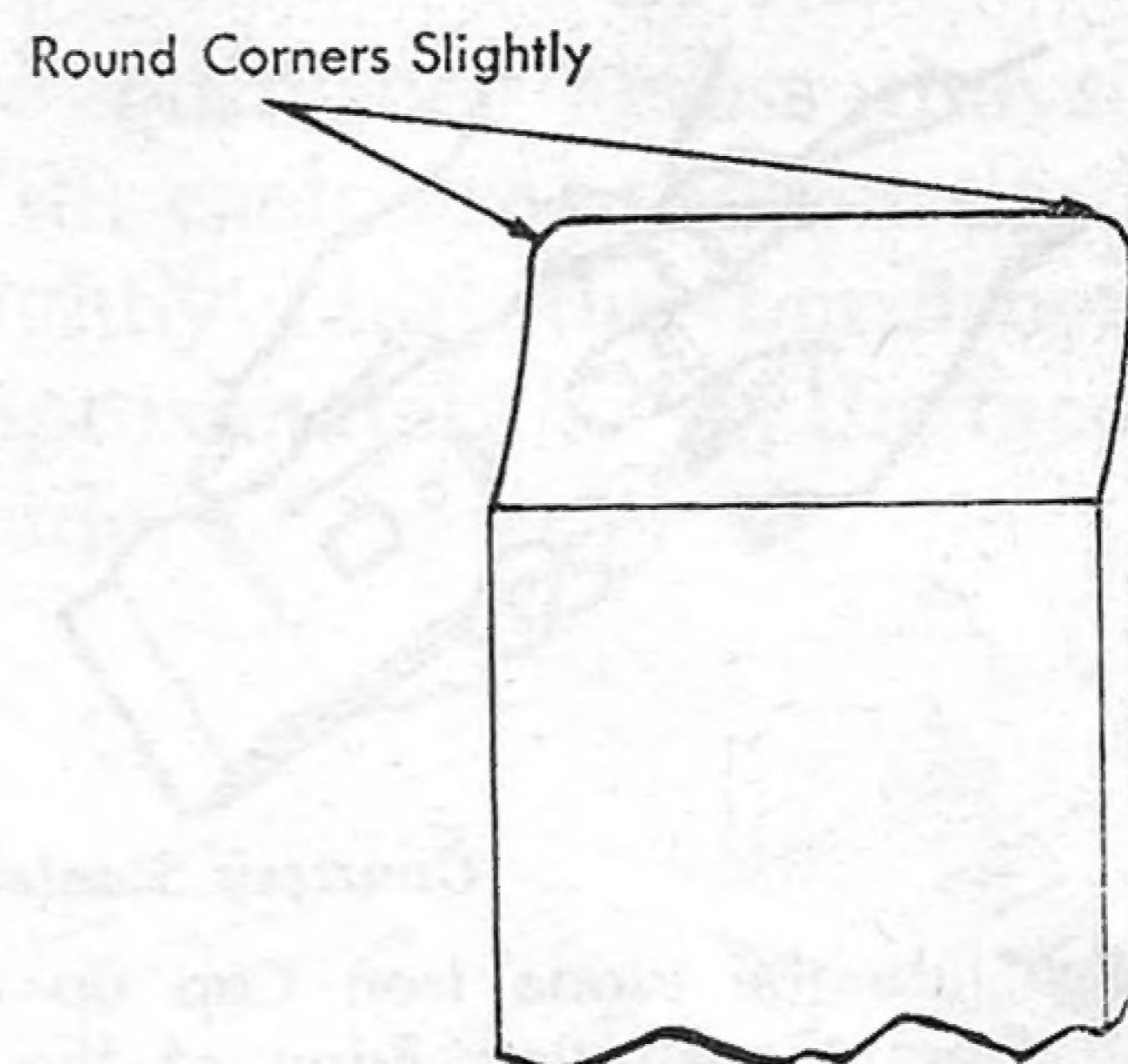
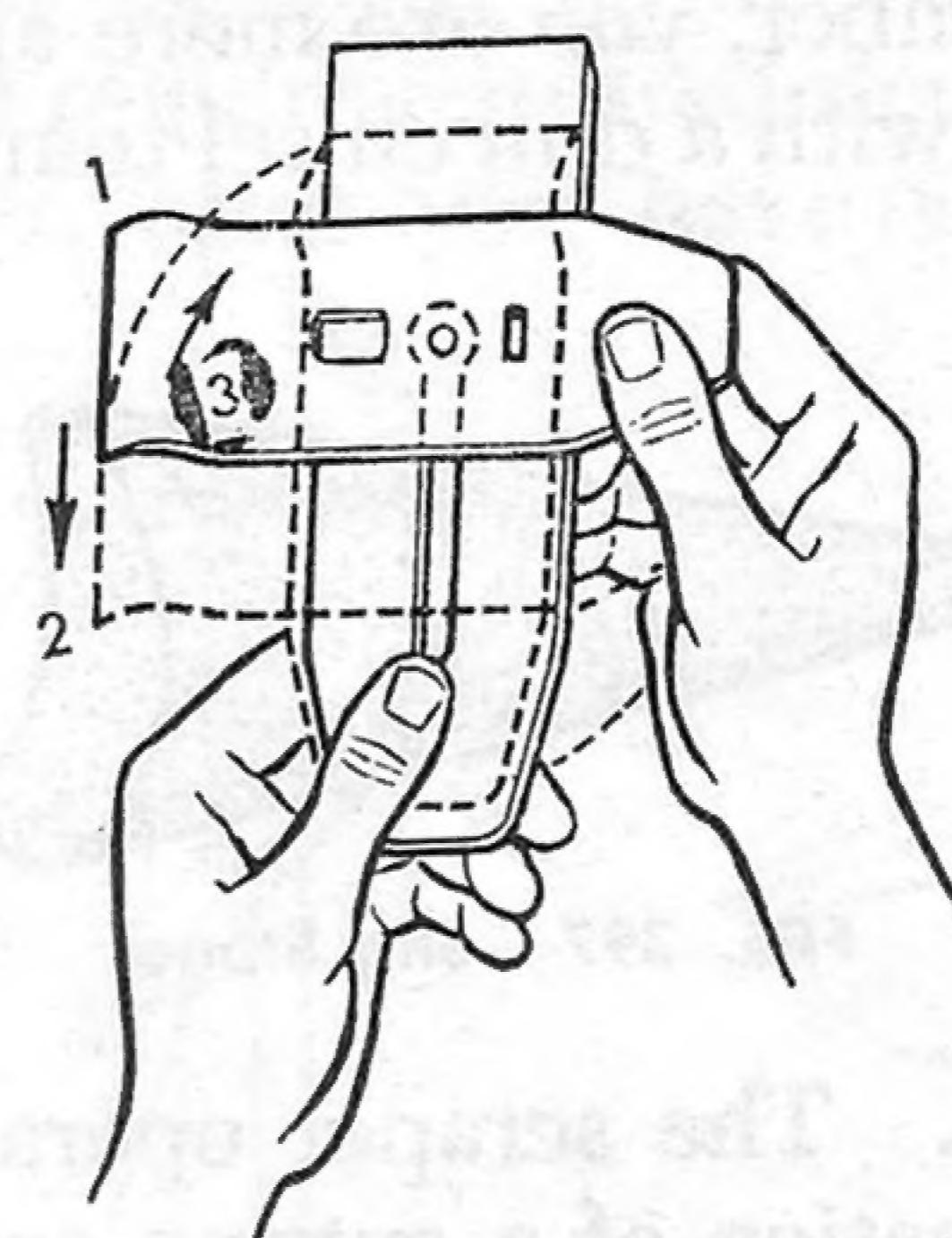


FIG. 393

blade (see Figure 392). Repeat these operations several times until the feather edge caused by grinding the blade is removed. Test the blade by touching it on the thumb nail. A few strokes on a leather strap will produce an even keener edge.

The blade should be very slightly rounded at the two edges as shown in Figure 393, to prevent it from digging in and leaving plane marks on the finished work.

When reassembling the sharpened blade and plane iron cap, be careful not to dull the keen edge. They should be assembled as shown in Figures 394 and 395.



*Courtesy Stanley Tools*

**FIG. 394** To put the Plane Iron and the Plane Iron Cap Together, Place the Cap on the Flat Side of the Blade With the Screw in the Lower Part of the Slot. Swing the Cap Around, Making the Edge Parallel to the Blade.

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T. MACINTOSH